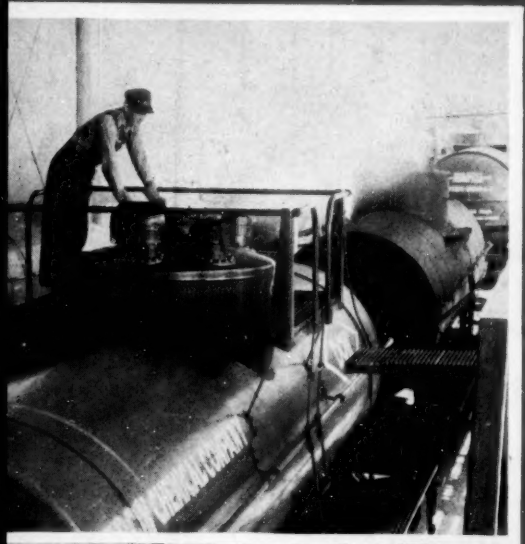
C W Report

Chemical Week

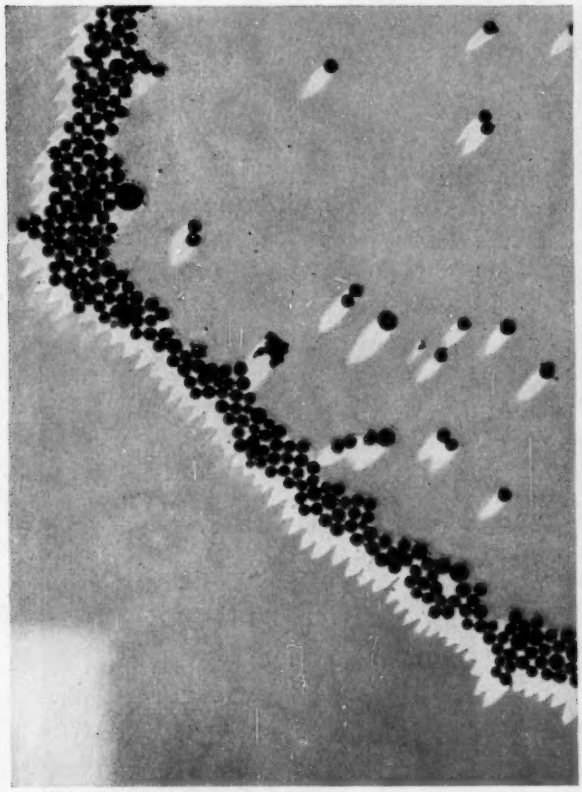
February 18, 1956

Price 35 cents

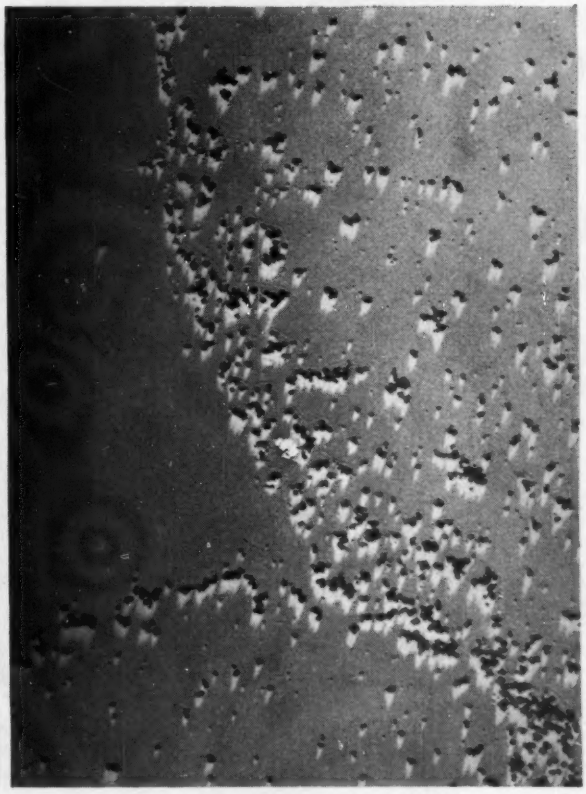


A McGRAW-HILL PUBLICATION

Electron Photomicrograph (10,000x) of normal nitrile rubber latex particles shows them to be approximately 0.25 micron (2500Å) in diameter.



Similar Photomicrograph of particles of new CHEMIGUM LATEX shows them to be only 0.05 micron (500Å) in diameter—about 1/5 of normal.



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DIVISION

COATINGS
DEPARTMENT

CHEMIGUM LATEX is extensively used in coatings, finishes, sizes, impregnants, saturants, inks, dyes and adhesives for papers, textiles and leathers. Permanence, washability, flexibility, strength, adhesion and resistance to oils, solvents, chemicals and abrasion are some of the properties it imparts.

In virtually all its applications, the principal reason for using CHEMIGUM LATEX is its binding action. To improve this action, Goodyear chemists decided to increase the area of contact between the latex particles and the surface involved by decreasing the size of the particles.

Pictured above is the result of their efforts. The five times smaller particles of new CHEMIGUM LATEX means a 25 *times* greater area of contact—a 25 times harder-working latex. What's more, this new latex exhibits excellent mechanical stability and a carefully balanced acid-salt ion tolerance for easier processing.

Full details on new, small-particle size CHEMIGUM LATEX are contained in the latest *Tech Book Bulletin*. It's yours by writing to: Goodyear, Chemical Division, Dept. N-9417, Akron 16, Ohio.

Chemical Week

TOP OF THE WEEK **February 18, 1956**

Chemical makers will have to scrape hard to boost sales in '56, says BDSA, should nonetheless tot up a 4-5% increase ..... p. 21

Almost certain: natural gas rates are going up. How will it affect present chemical industry plans? ..... p. 30

Nuclear energy is fast earning a growing place in the process industries. Here's how it will help you..p. 45

New rundown on royalty payments shows what it costs to license chemical processes ..... p. 70

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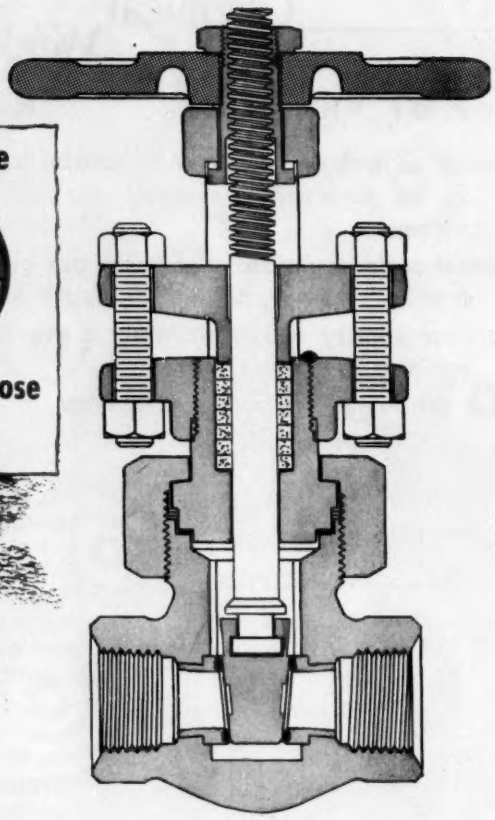
Second class mail privileges authorized at Philadelphia, Pa. Vol. 78, No. 7.



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Chemical Week

February 18, 1956 *Vol. 78, No. 7*

OPINION . . .

Birdwatchers' Battle

TO THE EDITOR: In your issue of Dec. 3, 1955, there was an article regarding the destructive work of the pileated woodpecker, which surprised me somewhat, as I knew these large woodpeckers were quite scarce and that it was considered quite an event among birdwatchers when one was seen.

Thinking he would be interested in the article, I sent it to a well-known local naturalist, Robert Sparks Walker. Although I told him it was not necessary to acknowledge or return the article, he did reply, and I thought his letter of December 20 might be of interest to you. It is enclosed.

A. J. KELLY
Burkart-Schier Chemical Co.
Chattanooga, Tenn.

DEAR MR. KELLY: I want to thank you for the tear sheet from CHEMICAL WEEK, Dec. 3, 1955, with the article "Woodpecker Repellent."

On Feb. 4, if I live, I'll reach the 78th milestone. I am wondering where I have been all these years not to take notice of the destructive work of the pileated woodpecker, as reported in that article.

I have been studying birds, and all woodpeckers, for almost 70 years, and I have yet to see the first telephone, light or telegraph pole ruined by a pileated woodpecker. It seems to me that about 99% of the article is an exaggeration.

I have been familiar with the region about our wildlife sanctuary for over 70 years, where some of the largest trees in the South are now to be found, and over 130 species. I have never known over one pair of pileated woodpeckers to live on that 110 acres at a time, and we rarely see them.

Woodpeckers do not peck holes in green trees unless they are hollow, and on our sanctuary I have never

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

FAMOUS LIGHTHOUSES OF AMERICA

PIGEON POINT LIGHTHOUSE is located on the Coastal Highway 5 miles south of Pescadero, California. Constructed in 1872, its 115-foot white masonry tower stands on a rocky headland that for many years has been a landmark for ships approaching the Golden Gate from the south. Pigeon Point and the lighthouse are named for the ship Carrier Pigeon, one of the many that came to grief on the outlying rocks in the years before the beacon was built.

Safe Guides to quality in electrochemicals are Niagara Alkali Company's skill and experience in production and its modern facilities for quality control. Put your trust in Nialk® Liquid Chlorine, Nialk Caustic Potash, Nialk Carbonate of Potash, Nialk Paradichlorobenzene, Nialk Caustic Soda, Nialk TRICHLORethylene, Niagathal® (Tetrachloro Phthalic Anhydride).

NIAGARA ALKALI COMPANY

60 East 42nd Street

New York 17, N.Y.

OPINION . . . . . .

seen them attack anything but a dead tree. The N.C.&St.L.Ry. has telegraph poles. I have never seen one of them destroyed by woodpeckers. The fact is, the pileated woodpecker is so scarce in this region, I have been thinking one of these days it would become extinct. So I wonder where these complainants are finding them?

ROBERT SPARKS WALKER
Executive Director
Chattanooga Audubon Society, Inc.
Chattanooga, Tenn.

We're going to take a ringside seat and let the birdwatchers battle it out. Kenneth D. Morrison, editor of Audubon Magazine, *says, "The pileated woodpecker is leading the assault on power poles. . . . The best brains in the power companies are fighting a battle with birds. So far, their poles are still full of holes. . . ."*—ED.

Read "West Coast"

TO THE EDITOR: Someone slipped: "Weyerhaeuser . . . became the first pulp company to put in its own electrolytic chlorine cells" (*Jan. 28, p. 17*).

Directly below where I am sitting, cells (Wheeler) were installed over 35 years ago. These were not the first in the industry. The plant has been relocated in the mill, but has been on the line since prior to 1920 and still produces. Today, Hooker cells are used. . . .

FRED V. DOUTT
The Champion Paper and Fibre Co.
Canton, N. C.

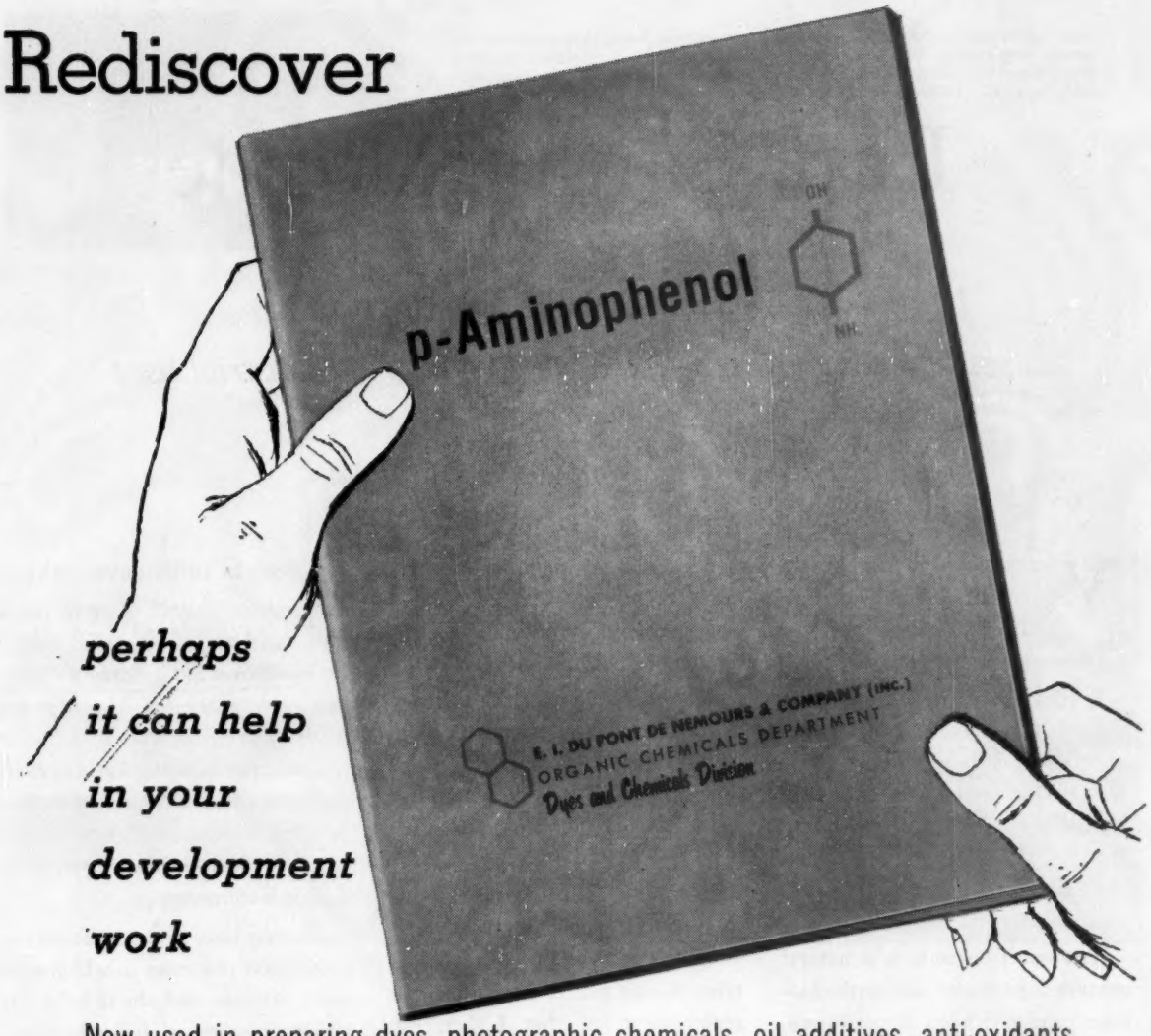
"Weyerhaeuser . . . became the first West Coast *pulp company . . . etc." is the way the copy should have read; obviously, we lost a couple of words along the route.* CW *surveyed the paper industry's captive chlorine facilities (which date back to the 19th century) last April 2, p. 24*—ED.

NRC Fungicide List

TO THE EDITOR: We believe it would be of some interest and service to your readers to know of our present studies in the field of industrial fungicides. . . .

Industrial fungicides are being compiled by chemical and trade names into a comprehensive list by the Prevention of Deterioration Center of the National Research Council-National Academy of Sciences, 2101 Constitution Ave., Washington 25, D. C. In-

Rediscover



perhaps it can help in your development work

Now used in preparing dyes, photographic chemicals, oil additives, anti-oxidants

Chemists are constantly finding new, profitable uses for Du Pont p-Aminophenol as an intermediate for new synthetic chemicals—such as photo developers, anti-oxidants and analgesics. To help you evaluate this highly reactive intermediate, Du Pont has prepared a booklet on the properties, reactions, derivatives and uses of p-Aminophenol.

Here are a few typical reactions. PAP reacts:

With Methyl iodide to produce p-methylaminophenol

With NaClO in dilute HCl solution to produce N-chloroquinonimine

With $KClO_3$ to produce Chloranil

With CH_3CO_2H to produce 4'-hydroxyacetanilide

With oxalic acid to produce 4,4'-dihydroxyoxanilide

With formaldehyde to produce polymeric p-(methyleneamino)-phenol

WRITE US TODAY for a copy of this booklet. Address: E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Dept., Chemicals Div., Wilmington 98, Del.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ORGANIC CHEMICALS DEPARTMENT

Rare Earth Chloride

available in large quantities at surprisingly low cost for a wide variety of industrial uses

a report by LINDSAY

You have probably always thought that rare earths are really rare. Some of them are very rare and very, very costly.

Fortunately, however, rare earth chloride is readily available in commercial quantities (and we mean carloads) to serve a wide variety of industrial uses. It is one of the most economical sources of rare earths, some grades costing in quantity lots approximately 30¢ per pound.

Rare earth chloride is a natural mixture of hydrated rare earth chlorides produced from monazite ore. It contains chiefly the chlorides of cerium, lanthanum, neodymium, and praseodymium with smaller amounts of samarium, gadolinium, and less-common rare earth chlorides.

The rare earths are trivalent metals, and rare earth chloride is an excellent source, and an economical source, of these heavy metals. It is a water-soluble salt showing relatively little hydrolysis. Like most other rare earth salts, its basicity is generally like that of calcium salts.

• • • •

When you flick your cigarette lighter, you are using misch metal (the stuff of which lighter flints are made) and this is produced from rare earth chlorides. Misch metal itself is used as an additive in many grades of steel.

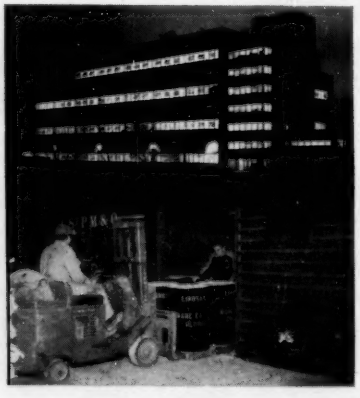
It's a versatile material, this rare earth chloride — it is used in paint and ink driers, as an anti-corrosive treatment for filter cloths, and in many other applications.

This unique material (there is nothing else quite like it) is challenging the imagination of research people in a wide variety of industries. Some see it as a possible replacement for other, higher cost materials. Others are exploring it with a view to improving production processes, enhancing product quality, and developing by-products.

Here are just a few of the many uses of rare earth chlorides. You are certain to discover others.

Caries inhibitors in tooth paste and dentifrices. Chrome plating bath additive. Silk loading. Primary cell carbon anodes. Mordant for leather and textile dyeing. Additive to baths for applying hot dip coatings to aluminum. Stypulant for embalming. Ultra-violet light absorber. Catalyst. Trace elements in fertilizer. Textile waterproofing.

You may have research projects or production processes in which rare earth chloride could be of help. To satisfy a researcher's insatiable curiosity, or to appraise its potentials in your operations, it will reward you to talk with us about rare earth chlorides. We'll be happy to send you technical data and a typical analysis.



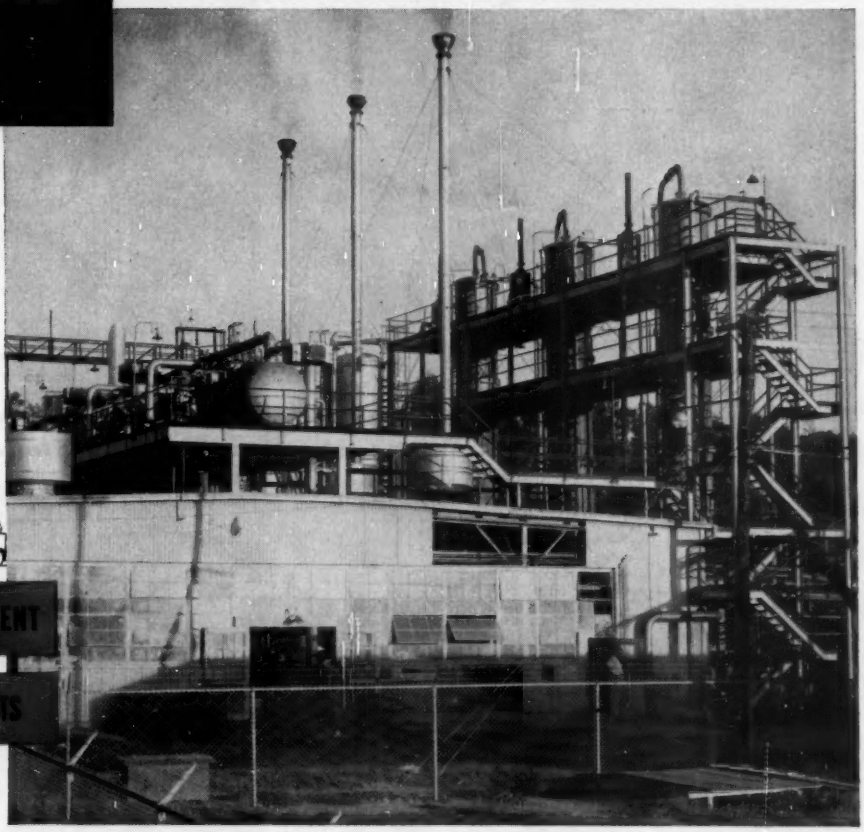
Photos show latest addition to Lindsay monazite processing plant at West Chicago and a car being loaded with rare earth chloride for shipment to a Lindsay customer.

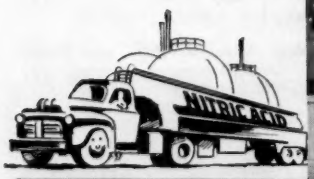
LINDSAY CHEMICAL COMPANY

270 ANN STREET, WEST CHICAGO, ILL.

NITRIC ACID PLANTS

Girdler nitric acid plants employ the well-known Du Pont process, using high-pressure catalytic oxidation, to produce nitric acid. These plants offer greater economy, in both investment and operating costs, than atmospheric or low-pressure units. With the high-pressure process 55%-60% nitric acid is produced with efficient use of catalysts, and with lower utility requirements.





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How you save money with GIRDLER know-how

WHEN you come to Girdler for nitric acid facilities, you get the benefit of the vast experience of DuPont as well as Girdler. DuPont's agreement with Girdler has combined the know-how of both companies. Moreover, Girdler has unsurpassed experience in building plants for the production of ammonium nitrate.

Because of this experience and new Girdler developments in nitric acid plants, you are assured substantial savings in capital investment and in operating costs when you specify Girdler. Mail coupon for bulletin on Girdler nitric acid plants.

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GAS PROCESSES DIVISION: New York, San Francisco.
In Canada: Girdler Corporation of Canada Limited, Toronto

OPINION . . . . . .

dustrial fungicides rather than agricultural and medical fungicides are the subject of this study.

To insure complete and authoritative coverage the center is requesting all manufacturers of industrial-type fungicides to submit trade and chemical names of applicable materials. . . .

WALTER M. BEJUKI
Research Associate
National Research Council
Washington, D. C.

SEE YOU THERE

American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler and Hotel New Yorker, New York, Feb. 19-23.

Technical Assn. of Pulp and Paper Industry, annual meeting, Commodore Hotel, New York, Feb. 20-23.

Sulphite Pulp Mfg. Research League and Technical Assn. of Pulp & Paper Industry meeting, Hotel Commodore, New York, Feb. 22.

Chemical Institute of Canada, 10th Divisional Conference, Royal York Hotel, Toronto, Feb. 23; Sheraton-Mount Royal Hotel, Montreal, Feb. 24.

American Institute of Chemical Engineers, Statler Hotel, Los Angeles, Feb. 26-29.

Cleveland Engineering Society, 13th annual Machine Design Conference, Cleveland, March 5.

Chemical Institute of Canada, 6th Divisional Conference, Chemical Engr. Division, Guildwood Inn, Sarnia, March 5-7.

Commercial Chemical Development Assn., annual meeting, Statler Hotel, New York, March 8.

Society of Plastics Industry, 14th annual conference, Sheraton-Brock Hotel, Niagara Falls, Ontario, March 8-9.

National Assn. of Corrosion Engineers, annual convention, Hotel Statler, New York, March 12-16.

Synthetic Organic Chemical Mfg. Assn., luncheon, Palm Terrace Suite, Hotel Roosevelt, New York, March 13.

American Society of Mechanical Engineers, aviation conference, sessions on high-temperature rocket engines, Hotel Statler, Los Angeles, March 14-16.

American Water Works Assn., Southeastern meeting, Bon Air Hotel, Augusta, March 18-21; Illinois meeting LaSalle Hotel, Chicago, March 21-23.

American Institute of Mining & Metallurgical Engineers, reactive metals conference, Hotel Statler, Buffalo, March 19-21.

11:00 A.M. EST: Merchants' New York office receives local phone call from troubled purchasing agent. Can you help us? Our Chicago plant needs 5 drums trichlorethylene *immediately*.

11:06 A.M. EST: Message goes out by teletype to Merchants' Chicago office, where rush order and delivery instructions are relayed to adjoining warehouse.

10:20 A.M. CST: Five drums of trichlorethylene are loaded on small delivery truck.

10:45 A.M. CST: Shipment arrives at customer's plant, less than an hour after initial call.

Ordered at 11:00 A.M. EST; Delivered at 10:45 A.M. CST

MERCHANTS CHEMICAL BEATS THE CLOCK!

For thirty-five years Merchants Chemical has made a habit of special service and prompt service in the distribution of industrial chemicals. The list of products includes acids, alkalis, fungicides, surfactants, chlorinated solvents, emulsifiers, laundry compounds, soaps, dry ice and chemical specialties.

In the instance outlined here, Merchants actually beat the clock in an effort to get material to a customer when and where he needed it. Close cooperation and an efficient communication system among the nationwide Merchants' offices made it possible. Wherever you locate, Merchants can serve you.

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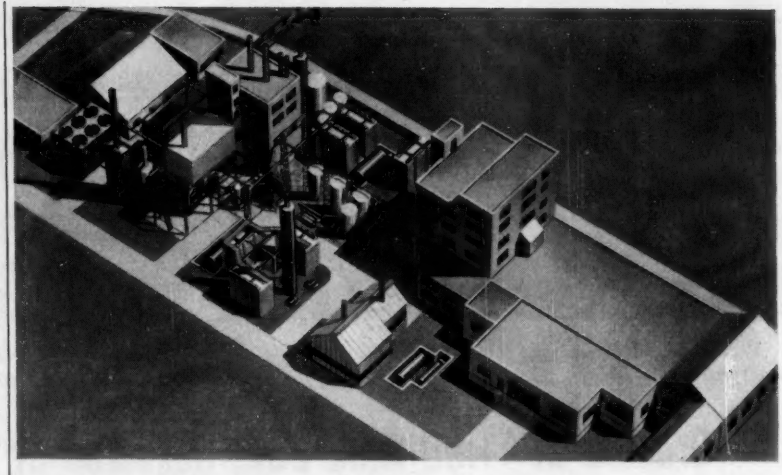
Lummus-Built Plant Will Double Phthalic Capacity For Pittsburgh Coke & Chemical

Paint and Plastics Producers to Benefit From Expansion

To double the phthalic anhydride capacity of Pittsburgh Coke and Chemical Company's Coal Chemicals Division, The Lummus Company is engineering and constructing a $3,000,000 plant on Neville Island in the Ohio River below Pittsburgh. The new plant, to be completed by Fall 1956, is a further step in Pittsburgh Coke's chemical expansion.

This second installation is being built because plasticizer and alkyd resin manufacturers need more phthalic. Since 1949, vinyl plastics consumption has risen 100%; alkyd resin paints 50%; polyester plastics 400%. Phthalic, as a basic raw material for these industries, is in ever-increasing demand. Increased phthalic consumption by Pittsburgh Coke and Chemical's own Plasticizer Division has also been a major factor in the company's planning.

As a result of its long chemical experience, Lummus is well equipped to carry out this project for the manufacture of phthalic. The new facilities will incorporate many improvements in production efficiency and product purity.



Artist's conception of expanded facilities.

Other current chemical projects at Lummus include ammonia and ammonia products installations, a vinyl acetate unit and acetylene derivatives facilities. And our books show hundreds of completed plants for a wide range of products from ethylene through butadiene.

When you plan your next plant, call on Lummus—designing engineers and constructors for the petroleum and chemical industries.

The Lummus Company, 385 Madison Avenue, New York 17, N. Y. **Engineering and Sales Offices:** New York, Houston, Montreal, London, Paris, The Hague, Bombay. **Sales Offices:** Chicago, Caracas. **Heat Exchanger Plant:** Honesdale, Pennsylvania. **Fabricated Piping Plant:** East Chicago, Indiana.

Business

Newsletter

CHEMICAL WEEK
February 18, 1956

The "Big Three" soap companies may have to produce just about every private record the government asks for. The U.S. charges that Procter & Gamble, Colgate-Palmolive, Lever Brothers, and the Assn. of American Soap and Glycerine Producers have conspired to dominate the U.S. soap and detergent market.

By an order signed last week by Federal Judge Alfred Modarelli, Procter & Gamble must, within 60 days, produce budget workbooks for departments that produced or sold detergents; all contracts that involve petroleum-base detergent materials; and production records of the companies selling such materials to P&G, for varying periods going back as far as Jan. 1, 1946.

The order raises an interesting legal point: if it's accepted as a precedent in other antitrust cases, it could make it as easy for the government to prosecute civil cases as criminal suits—where it can subpoena any record it wants.

•

How should compressed gas cylinders be identified? This question, now answered only in voluntary standards set up by the Compressed Gas Assn., in various companies' own standards, and in the specifications set up by some large-volume users, might be put on a mandatory basis. At least that's the aim of Rep. Harry McGregor, who has introduced a bill to require mandatory labeling under federal supervision. He's acting at the request of Cooper-Bessemer Corp. An explosion that destroyed the company's test laboratory (and killed three engineers) was traced to a cylinder labeled as nitrogen, but which really contained oxygen.

The standards McGregor proposes generally follow CGA's voluntary recommendations, established in their present form seven years ago.

•

Monsanto will expand its phthalic anhydride facilities at Everett, Mass., by 60%. It will begin construction next month, and hopes to have the new unit on line early in 1957. Most of the production will be captive, since Everett has recently upped its phthalate ester capacity by over 50%.

And a coal chemicals expansion is planned for U.S. Steel's Geneva, Utah, plant. The company will boost its light oil capacity—now at about 7 million gal./year of benzene, toluene, xylene, and similar fractions—and will also add facilities for recovering phenol and by-product ammonia.

A new nitric acid unit with a 150-ton/day capacity is planned by Commercial Solvents at Sterlington, La.

A two-way phosphate expansion is planned by Electric Reduction Sales Co. at Hamilton, Ont. The company will install facilities for making phosphates from electric furnace phosphorus and via wet-process phosphoric acid. Plant start-up is scheduled for early 1957.

•

Stauffer Chemical will use the services of the sales firm Wilson & George Meyer & Co., which had just terminated a sales agreement with American Potash and Chemical (*CW Business Newsletter, Feb. 11*). The companies have now signed a long-term exclusive sales agreement under which Meyer will broaden its sales setup in the West and Midwest to handle Stauffer's recently increased production of pelletized agricultural phosphates.

•

The second process industry natural gas contract in Washington state has been signed. Ideal Cement, in a five-year pact, agrees to buy about 700

million cu. ft./year of gas from Pacific Northwest Natural Gas (*CW, Feb. 11, p. 22*).

•

And Dow Chemical has contracted with the government's international Cooperation Administration for insurance protection (against inconvertibility or expropriation) of a $1,320,000 investment Dow is making in the Netherlands.

•

Elsewhere in finance, the week brought these '55 earnings statements:

Michigan Chemical saw net sales reach $6.5 million (up 12%). Net was $341,314, after an income tax credit made possible by 1954's $228,894 net deficit.

Newport Industries, with a 21% increase in sales, to $22 million, had a $1-million profit—up 275%.

Cowles Chemical, which reported $6.3-million sales (a rise of 11%), netted $261,570, up 65%.

Interchemical, whose unaudited figures show a 12% sales increase, joined the list of corporations with $100-million yearly sales—with $489,000 left over. Its profit, of $4.7 million, was up 26%.

Atlas Powder, in its annual report mailed to stockholders this week, reported that its earnings of $4.70/share (up 31% from 1954) would have been 33¢ higher—if only its Tamaqua, Pa., plant had not suffered flood damage.

Eli Lilly, which has manufactured far more Salk polio vaccine than any other company, reported a $16.3-million net, a 44% jump over 1954.

And the vaccine supply situation, though much better this year than last, is in for a new review. U.S. Surgeon General Leonard Scheele estimates that 196 million cc. of the material will be available during '56—an amount great enough to give three shots to all children under 20, and to all expectant mothers. But his boss, Health Education & Welfare Secy. Marion Folsom, wants to be sure there'll be no shortages. He'll meet with heads of companies making the vaccine to find out if the estimate is realistic, and how production could be expedited.

•

A last minute reprieve for coal-tar color makers has come from the Food & Drug Administration. It has rescinded its order, which would have barred use of the oil-soluble dye, FD&C Red No. 32, to color orange skins.

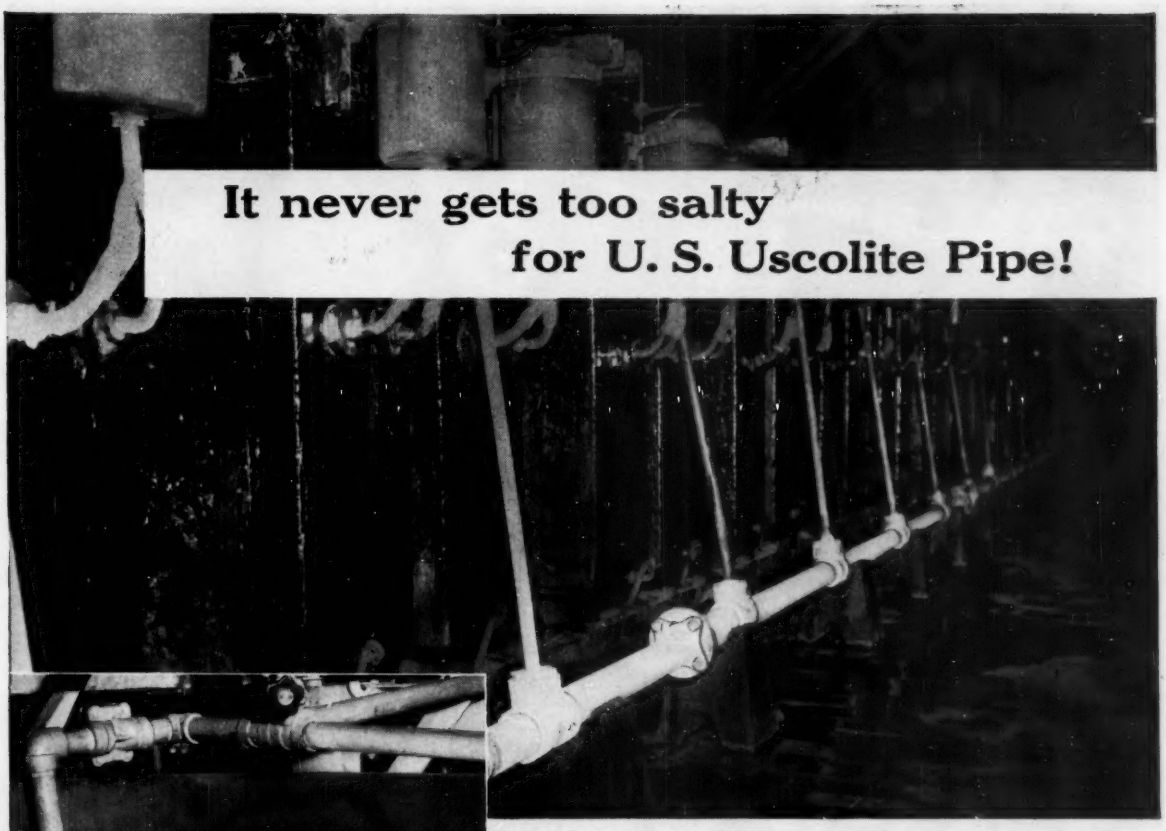
At Congressional hearings called at behest of Florida & Texas citrus growers, FDA said it would give industry three years to prove Red 32 harmless for human consumption, or to develop and prove out a new nontoxic dye.

Hoffmann-LaRoche has developed a new dye that might be used for coloring citrus skins—but it told inquiring congressmen it needs a couple of years for toxicological tests, and to get production going.

•

The government sells, the government buys.

The bankruptcy sale of Westmoreland Manganese Corp.'s plant and equipment (*CW Business Newsletter, Feb. 11*), forced by the government's foreclosure, found bidders representing the U.S.-owned nickel plant at Nicaro, Cuba (*see page 23*), spending the most money— $475,000. The sale netted just over $1.3 million. All will be applied to the government's judgment of $2.8 million, and to the $350,000 in claims filed by private creditors.



It never gets too salty for U. S. Uscolite Pipe!

View of cell room. The Uscolite piping feeds the brine into electrolytic cells, where it is broken down into caustic soda, chlorine and hydrogen.

Uscolite pipe carrying sodium hypochlorite to a storage tank lined with U. S. Permobond® corrosion-resistant lining.

Controlling highly corrosive brine was a major problem for a Providence, R. I., maker of chlorine products. The brine attacked the piping and replacements had to be made every 6 months. In addition, corrosive fumes shortened the life of another piping system in the plant.

Then U.S. Uscolite® Plastic Pipe was installed. Result: no signs of corrosion of any kind, in either piping system—even after over a year of operation. Savings in piping replacement and maintenance will continue for an indefinite time.

A product of United States Rubber Company, U. S. Uscolite Pipe has great impact strength. Yet it's very light in weight. It's available also in pipe fittings, valves, and sheet stock for fume ducts—will resist acids, salts, alkalies and gases, inside and out.

For replacement or completely new piping, get in touch with any of the 27 "U.S." District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y.

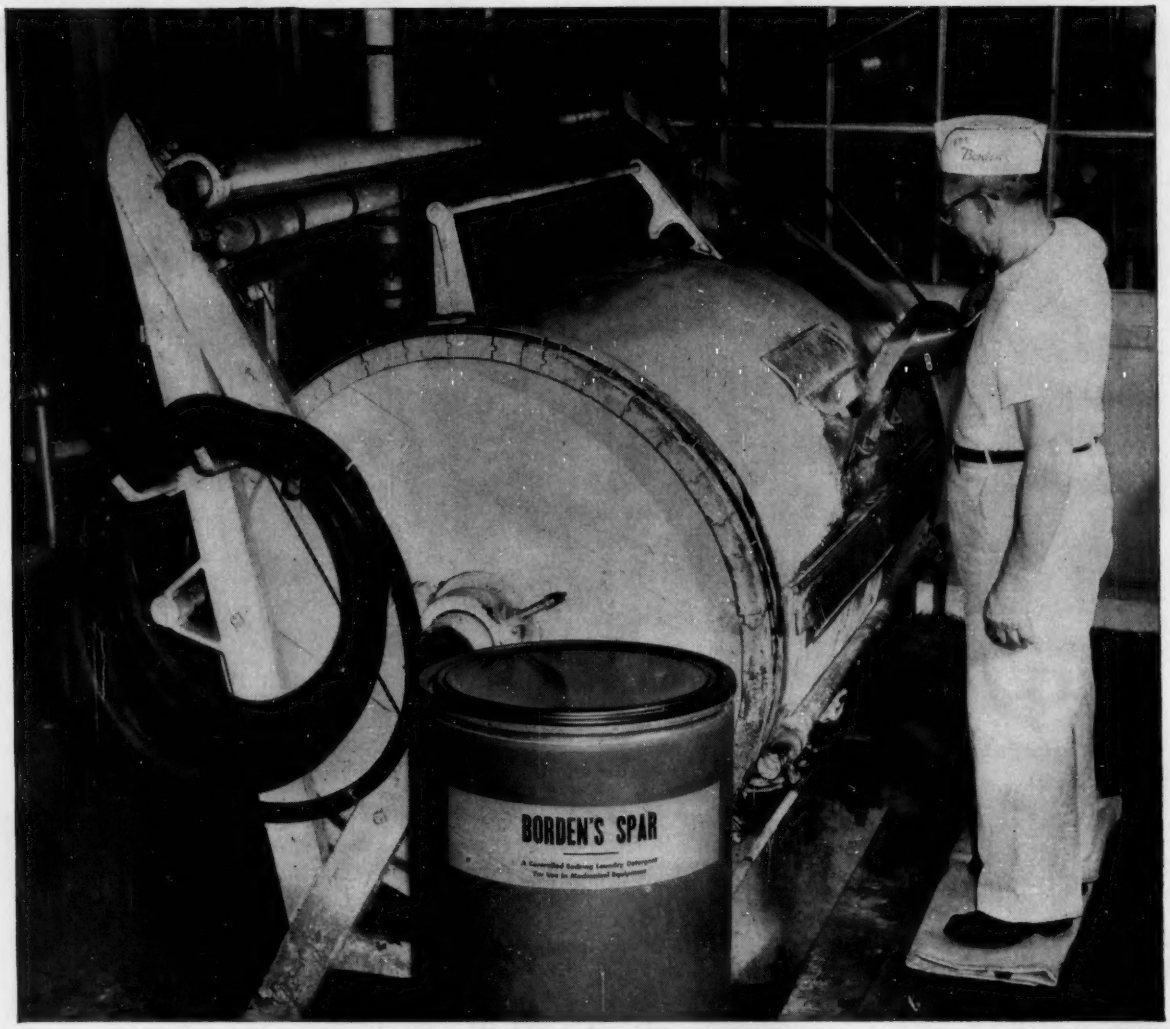
Uscolite pipe and fittings are made in the broadest and largest line of stock sizes on the market. Sizes follow:

● Molded fittings in ½" through 4" I.P.S. ● Molded flanges ½" to 6" I.P.S. ● ½" to 3" Uscolite diaphragm valve (Hills-McCanna). ● Pipe in standard wall dimensions and extra heavy wall dimensions in ½" through 6" pipe sizes.

US RUBBER

Mechanical Goods Division

United States Rubber



In Food Plant Laundries, too, THE KEY IS CMC

Where cleanliness must be the byword —as in the plants of the Borden® Company—a controlled sudsing detergent based on Hercules CMC provides an efficient and economical formulation for laundering plant uniforms.

The addition of CMC to Borden's own "Spar" supplies the exceptional soil-suspending properties that prevent redeposition of dirt on clothes. With CMC, uniforms get whiter, faster—dirt particles always go down the drain with the rinse water. And with CMC you save hot water in your washing operations.

The advantages of economical CMC are well-known to commercial laundries and leading manufacturers of detergents everywhere. If you are among the few who have never tested CMC . . . do it now! Technical information and a testing sample are available on request.

Virginia Cellulose Department
HERCULES POWDER COMPANY
INCORPORATED
992 Market St., Wilmington 99, Del.

VS56-1

February 18, 1956 • Volume 78 • Number 7

Chemical Week

During 1956, chemical companies will see . . .

- Progressively keener competition, but will still have a record . . .
- $24.4 billion in sales, up 4-5% from 1955, and . . .
- A 3-4% increase in production . . .
- But mounting costs will mean new efforts to boost efficiency, diversify products. This means . . .
- $425 million may be spent for research, and . . .
- Over $1.1 billion for new plants.

Still Rising, but Slower

The question of what will happen to the current business boom may well be replacing baseball and the weather as favorite topics of executive conversation these days.

And with such bearish economic omens as a further cut in automobile production and a fall in stock prices to consider, many businessmen are becoming pessimists. But others, especially chemical men, have a rosier summary to consider: Business & Defense Services Administration's forecast of a 4-5% increase in this year's chemical sales over the '55 record of $23.5 billion.

The forecast was compiled under the direction of George Fowles, on loan from Goodrich Chemical to head BDSA's Chemical and Rubber Division. The division's specialists keep close tabs on some 250 different chemicals and a variety of rubber products.

There's no chance, they report, of a repeat of the whopping 20% gain that '55's total represented over '54 sales.

Some of the predicted 4-5% increase will represent an actual volume boost; the rest, an increase in chemical prices—which stayed fairly stable throughout '55.

Output of chemicals will pretty much follow the current rate of increase. Where production in the first six months of '55 was up 8% over the previous half year, the second half of '55 showed only a 2% gain over the first six months. BDSA's prediction for all of '56: a 3-4% increase. A moderate degree of inventory buildup is expected in the first half of this year to support the continued high sales volume.

Upping the Effort: A squeeze is ahead, however, between production costs and prices that can be charged; so '56 will bring new drives to boost efficiency and diversify production. As a major part of this effort, chemical makers plan to spend over $1.1 billion for new plants (up 13%), and perhaps $425 million in researching new products and processes.

On specific chemical materials, these were the forecasts:

• Elemental sulfur and virgin sulfuric acid output will hit new peaks of 6.5 million long tons and 15.3 million short tons, respectively. Consumption gains in 1956 won't show as large a jump as in 1955. Best guess is for a mild climb early in the year, a seasonal slackening in midyear, and "possible increase" toward year's end. With rated capacity for 100% sulfuric acid due for an 850,000-ton boost to 19.3 million tons by year-end, outlook is for ample supply, stable prices.

• Chlorine and alkali output and sales will hold at, and may top, last year's near record through the first half of 1956. New capacity coming in later this year assures easier supply of caustic, soda ash and chlorine for next year. The international caustic market will remain tight until early 1957, when new foreign plants start up.

BDSA'S FOWLES: His specialists see sales, output gains—on modest scale.

• Hydrochloric acid should see the continuation of last year's consumption rise, but at a slower rate. Supply will be adequate and prices firmer than in the previous two years.

• Phosphorus and phosphatic chemicals should see continued growth and expansion on top of last year's 9% gain. A 20% expansion in phosphorus capacity now under way or planned will be completed this year and next.

• Chromium chemicals will remain in tight supply, particularly bichromate. Hopes for relief from larger imports are not materializing, as

South Africa suppliers defer expansion plans.

- Hydrogen peroxide output is near the industry's capacity. Both output and consumption are expected to rise in 1956.
- Sodium compounds are expected to continue on their upward output/sales trend. Look for higher prices on most compounds.
- Fertilizer activity in the first half of 1956 could top by 20% the record set in the first half of 1955. About 450,000 tons of anhydrous ammonia capacity will be added by the end of '56.
- Pesticides sales should continue upward.
- Plastics producers should have another record-breaking year, with output likely to hit 4 billion lbs.—a 10% gain over '55 production.
- Paint producers expect to top last year's $1.5-billion sales record.
- Benzene output, stable in recent months, may slightly exceed the 1955 level. Expansions are under way on a broad front of organic chemicals. Price increases on crude naphthalene and phthalic anhydride are fair bets, but firm prices are expected to prevail for most organics.

Cooperative Chemicals

Latest farm cooperative to take on the role of agricultural chemical producer—as did National Farmers Union (*CW, Dec. 24, '55, p. 13*)—is Central Farmers Fertilizer Corp., a firm owned by 14 of the largest farm co-ops in the north-Midwest.

Final hurdle before building a multimillion-dollar phosphate mine and electric-furnace processing plant at Georgetown, Idaho, was cleared last week with the signing of a power contract with Utah Power & Light Co. The utility firm will provide electricity at a cost of 5 to 5.5 mills.

Center of the complex will be an electric furnace with an input rating of 35,000 kw.—largest elemental phosphorus unit of its kind in the West. (Monsanto has two 30,000-kw. furnaces at nearby Soda Springs.)

All the phosphorus will probably be used to produce calcium metaphosphate, which will be shipped to Minnesota's Twin City area for blending—or for sale as is.

Construction of the Georgetown installation is scheduled to begin this spring, with completion in 1957.

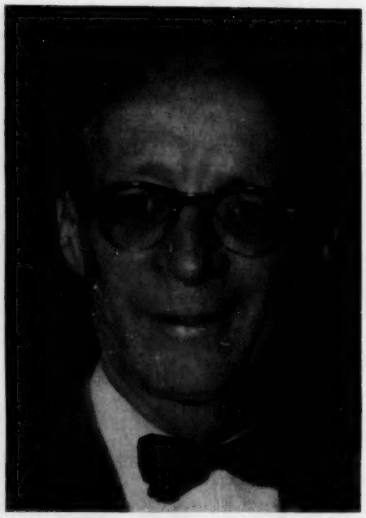
Mergers and Demands

This week, as oil companies make a 6% pay rise almost unanimous, the question is: Will the chemical industry have to follow suit?

The answer: No. But the biggest union whose members got such a raise—Oil, Chemical and Atomic Workers (AFL-CIO)—plans to use the same bargaining method with chemical companies.

A CHEMICAL WEEK *reporter, in Miami Beach for the meeting of the AFL-CIO executive committee, got this reaction from OCAW's President Jack Knight:*

The oil settlement will be a big factor in changing the bargaining pattern in chemicals.



OCAW'S KNIGHT: His organizing locations—pinpointed but secret.

"The success we've been having with the oil industry," Knight said, "will show our chemical people (the leaders of OCAW's chemical plant locals) that, in the future, they'll have to push a single wage demand." But he went on to admit that it will take "pressure and persuasion" to change the chemical bargaining pattern.

Right now, though, organizing is the big point. Knight said that a big problem to be decided at Miami Beach is that of dividing up nonunion territory.

The targets have been pinpointed. And though Knight wouldn't say what they are—he hopes to keep them secret until the organizing gets under way—apparently they are spelled out on a state and local territory plan, rather than on a company-by-company basis.

Merger Bound? Knight, whose union is already the product of a merger between two former CIO unions, reiterated that he's been talking merger with Ed Moffett's once-AFL International Chemical Workers Union. But he won't be pinned down on timing. Both unions are choosing delegates to attend a merger conference originally planned for this month, now likely to be held in March.

He won't predict the merger, but he won't rule it out for later this year. The one sure thing is that it won't come before October, when Moffett's chemical workers hold their convention in Buffalo.

Over-all Answer: In any case, all signs point to merging oil and chemical bargaining. The demands, though they may not be the same in both industries, will at least be coordinated. And it looks as if centralization of chemical bargaining is definitely in the cards.

...and the Independents

While Jack Knight talked unity and coordination in Miami Beach, independent unions, meeting in Washington, D.C., last week, set plans for a new labor group—a haven for some 1.8 million chemical and other workers organized in unions outside the merged AFL-CIO.

This drive for unity and coordination is basically defensive. The independents hope to keep AFL-CIO "poachers" away from their plants. An independent union (as viewed in organized labor circles) is a group set up by management to keep out national unions, and to be weak enough not to make tough demands on management.

While such a label is debated by the independents, it's recognized that individual plant groups are prime game for AFL-CIO organizing.

Two loosely federated groups of independents are leading the way toward amalgamation, and a third, which bulks large in petrochemicals,

may follow. If plans agreed upon last week are accepted by union membership, the sprawling Confederated Union of America and the National Independent Union Council will hold a unification convention in Chicago, Sept. 26.

In the Running: Also to be considered is the recently formed National Federation of Oil Unions. This group is now planning to meet in the next "two or three months" to organize permanently and decide whether to enter the big federation.

But even without oil-group entry into a federation, the organization would have substantial chemical importance. NIUC now includes the Du Pont local at Kearny, N.J., Pitman-Moore at Indianapolis, and (since last week) the big Mallinckrodt independent union group at St. Louis.

Formidable Fight

In Wilmington, Del., Court of Chancery late last week, Delaware Chemicals, Inc., gained points in its legal fight to stop Reichhold Chemicals from making pentaerythritol.

For Chancellor Collins Seitz has now turned (1) thumbs down on Reichhold's bid for summary judgment dismissing Delaware's complaint; (2) thumbs up (because of statute of limitations laws) on Delaware's motion to toss out of court RCI's counterclaims of alleged fraud and misrepresentation.

Trouble began for the two PE makers last February when Delaware asked for $1 million damages and an injunction halting Reichhold's production of the compound.

Delaware bases its claims on a contract between the two signed in 1950, which, it says, granted RCI all Delaware's PE manufacture know-how. But RCI (on Dec. 29, 1950) terminated the agreement.

According to Delaware's claims, Reichhold at that time promised it would stay out of PE production. Now, though, RCI produces PE at Tuscaloosa, Ala.

So Delaware slapped RCI with an injunction and $1-million damage suit. Reichhold later countered, asking $150,000 in damages and a $2-million judgment.

But as matters stand now, with counterclaims dismissed, Reichhold can only amend its counterclaims and prepare to use them in its forthcoming defense against Delaware's claims.

Fit for the Future

By March 7, Miles Laboratories will hitch another wagon—Takamine Laboratory (Clifton, N. J.)—to its corporate star. And the new addition seems to fit right in.

Takamine is prominent in pharmaceutical and industrial enzyme production; Miles currently makes citric acid (in addition to its regular proprietary and ethical drugs, and chemicals) by deep fermentation—a technique often used to make enzymes.

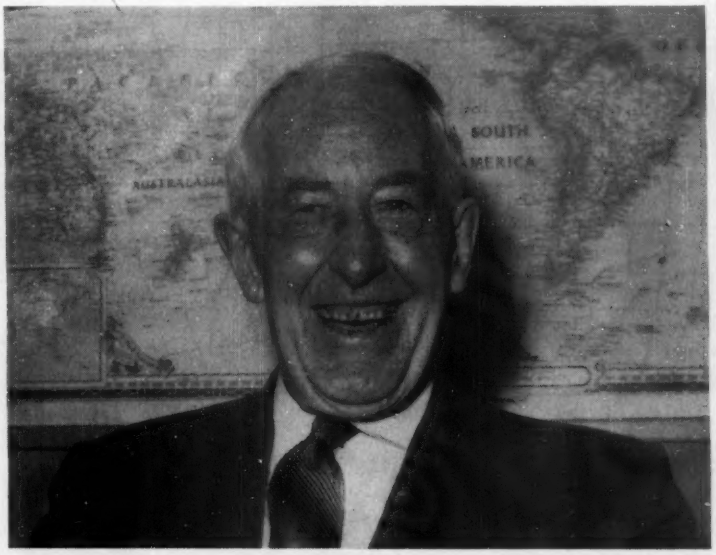
But there's more behind the merger move than just the fit. Miles believes there's a chock-full-of-profits future in enzyme production and its management wants to capitalize on the potential.

As Robert Smith, Miles' assistant to the president, reports: "Commercial interest in enzymes has blossomed in the last 10 years. Just look at the patents in the field. Up to 1946, the Patent Office had issued a total of four enzyme patents. Since that time, 109 have been granted. And don't forget, last year's Nobel prize in medicine was awarded for work in enzyme chemistry."

Takamine was founded back in 1898 by adrenalin-discoverer Dr. Jokichi Takamine—better known to the public as the man who brought the cherry trees to Washington.

The firm was one of the first to tangle with commercial enzyme production. Today, it's still making strides in the field, is actively pushing such new items in its line as deoxygenase gluconase, and pectinase (both used by food industries).

Takamine, which will become a Miles division, will be operated as an independent unit.



Government's New Broom

A GOOD HOUSEKEEPER for the military will head the government's civilian housekeeping agency, the General Services Administration. Franklin G. Floete, former defense supply chief, was named to replace Edmund Mansure, who had been under heavy fire for actions concerning a $43-million expansion of the Nicaro, Cuba, nickel-producing complex, operated by National Lead. Though Mansure has resigned, a Congressional group has voted to send his testimony to the Justice Dept. for perjury review.

Site-Choosing Pains

As chemical firms expand, they're finding it's more and more difficult to get title to plant sites with the most advantageous combination of raw material, process water and power supplies, combined with nearness to markets and other factors.

A good example of the trouble some go to is the labyrinth of maneuvers required of Allied Chemical when it took title to a $525,000 site at Arco, a small town near Brunswick, Ga., on which its Solvay Process Division will erect a chlorine/caustic plant.

The seller of the southern portion of the site, Rayonier Inc., inserted a clause in the deed that bars Allied from either erecting a pulp mill of its own there or selling the land to any other pulp or cellulose mill "now doing business in the state of Georgia." This was apparently aimed at Brunswick Pulp and Paper Co., which owns land immediately south of the property. Violation would cause the land to become Rayonier's property once again.

Rayonier, which had planned to build a plant there but erected it at Jesup, Ga., instead, received $150,000 for the land, nearly $93,000 more than its original investment in 1949.

Use of large septic tanks now on the property—which serve much of the Arco community sewerage system — must be guaranteed. Too, Allied agreed to build drain lines to carry effluent from these tanks into nearby Purvis Creek.

Dumping of wastes from the new Allied plant into Turtle River was restricted by the Georgia Power Co., which deeded 475 acres to Allied for $50,000.

The balance—and ironically the biggest portion—of the land for the Allied site was obtained from Dixie Paint and Varnish Co. for $325,000 —with no strings.

Allied, which strongly emphasizes that the limitations imposed will not affect its operations, now has only to build the plant.

Heavy-Water Bid

The finer outlines of Farbwerke Hoechst's new heavy-water unit (*CW Technology Newsletter, Oct. 29, '55*) are now more clearly defined as new details become available.

The new installation will include a $1.5-million distillation plant capable of turning out 6 tons/year of heavy water, primarily for use in Germany's atomic energy program, but also for sale to other European consumers.

And it's now firm that Hoechst will recover the deuterium by rectifying liquid hydrogen at —252 C—a production temperature reportedly lower than that in any other commercial plant that has carried out similar operations.

This method of rectifying, the company asserts, gives lower installation and energy costs.

Substantial reductions in the asking price should boost demands for the neutron-slowing agent. Hoechst plans to offer it for $8/gram in contrast with the present $45/gram U.S. export price, a figure understood to be below production costs.

The unit will probably be operating during 1957.

Six tons is only a small fraction of annual U.S. production, but completion of the new plant will put Hoechst into the lead in continental output of the costly chemical. Production is already under way at plants in France, Norway and Sweden. In addition, studies of methods of large-scale production of heavy water are just beginning in India.

India Does-It-Itself on DDT

INDIA CUTS INTO another traditional market for U.S. exporters, as a new DDT plant, first of its kind in the country, goes into operation near New Delhi. The plant will produce 700 tons/year of the insecticide, was built with India government and United Nations funds. Shown here, G.N.S. Rao, works superintendent (*right*), checks the odor of the first slab of DDT produced, before its granulation, while the UN's D. L. Crowle (*center*) and an Indian technician wait their chance to check production. Already on the drawing board: plans for doubling the plant's production of DDT and related materials.

EXPANSION. . . .

Reynolds Metals Co. will spend $1.5 million at Jones Mill, Ark., to hike aluminum smelting capacity to 200 million lbs./year. In addition, Reynolds may construct a $150-million aluminum reduction mill near Lake DeSmet, Wyo.

•

Additional facilities tripling Canadian Industries Ltd. capacity to produce chlorine, hydrochloric acid and caustic soda at Cornwall, Ont., will be in full-scale production by mid-1956.

•

Herbicides: Chipman Chemical Co., Inc. (Bound Brook, N.J.) will construct a 2,4-D and 2,4,5-T unit at Portland, Ore. Expected onstream this

Washington Angles »»

»» **Industry beefs on proposed patent fee boosts** have been recognized by the House Judiciary Committee. Result: the earlier proposal for higher fees has been watered down. And it's in this form that the bill will likely pass the House. As now recommended, filing and final fees would both be raised to $40, plus $2 for each claim over 10—from the current $30, plus $1 for each claim over 20.

»» **If the National Science Foundation** has its way, the government's rubber research laboratory will go into private hands next year. Now operated under contract by the University of Akron, the lab will be leased to the university by July 1, if its directors okay the current proposal.

And Institute will be sold. Both the House and Senate last week rejected moves to veto sale of the West Virginia GR-S rubber plant to Goodrich-Gulf Chemicals.

»» **A big batch of atomic energy reports** is being declassified by the Atomic Energy Commission. Commission chief Lewis Strauss told congressmen that about 9,000 will be available in a month or so. Still to be under wraps: 6,400 documents classified as "confidential" and 9,000 "secret" reports.

Strauss has been attacked for excess secrecy on industrial atom uses; and Sen. Clinton Anderson, who heads the Joint Atomic Energy Committee, wants all nonmilitary information completely declassified.

»» **The chemicals-in-food hearings,** which wound up this week, won't be the last such look-see by a Congressional group this year. The House Commerce Committee will hold hearings on cosmetic chemicals by midyear; but even if any resulting bill passes the House, it has no chance in the Senate.

»» **"Texas City would look like a bonfire"**—it's this comment about the possible result of accidents involving atomic reactors that has had many chemical companies wondering whether atomic processing is for them. But now, private insurance companies will offer up to $60 million worth of public liability coverage and $50 million for plant damage. Such coverage should more than take care of any chemical firm's need.

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spring, it will have a capacity of 5,000 tons/year, cost roughly $1 million.

•

Cement: Production by Wyandotte Chemical Corp. of high-quality portland slag cement will be doubled to a total of 2.5 million bbls./year at a cost of $2.5 million.

American Marietta Co. will construct a plant at Roberta, Ala., boosting cement and lime capacity of its Southern Cement Co. Division by 60%. Cost: $15 million. Part of the new capacity should be in by this summer; full production is expected by early 1957.

COMPANIES. . . .

St. Regis Paper Co. hopes to gain control of Rhinelander Paper. An offer to exchange stock will soon be made to Rhinelander's stockholders. The exchange, if approved, will be on a share-for-share basis and will involve the 540,000 shares of Rhinelander common now outstanding. St. Regis plans to file a registration statement with Securities & Exchange Commission this month.

•

Morton Salt Co. will spend $4 million for a new building to house its Chicago executive and general offices. Construction will start early this summer, with completion slated for early 1958.

Morton plans to occupy one and one half floors and lease the rest of the building.

•

Concord Chemical (Moorestown, N.J.) has purchased all major assets of Standard Soap Co. (Camden), producers of soaps, disinfectants and textile specialties. After closing out its operations in Moorestown this month, Concord will move plant, personnel and offices to the new location.

•

Zonite Corp. has tentatively selected a site in Wayne Township, N.J., for construction of new general offices and laboratory facilities. Walter Kidde Constructors Inc. has been retained to engineer the project.

FOREIGN. . . . . .

Specialties/France: The French chemical companies Progil, Kuhlmann and Saint-Gobain will provide production facilities for a new French chemical firm. Listing capital assets of 120 million francs, the new company will produce detergents, disinfectants and insecticides, under Diversey Corp. patents.

•

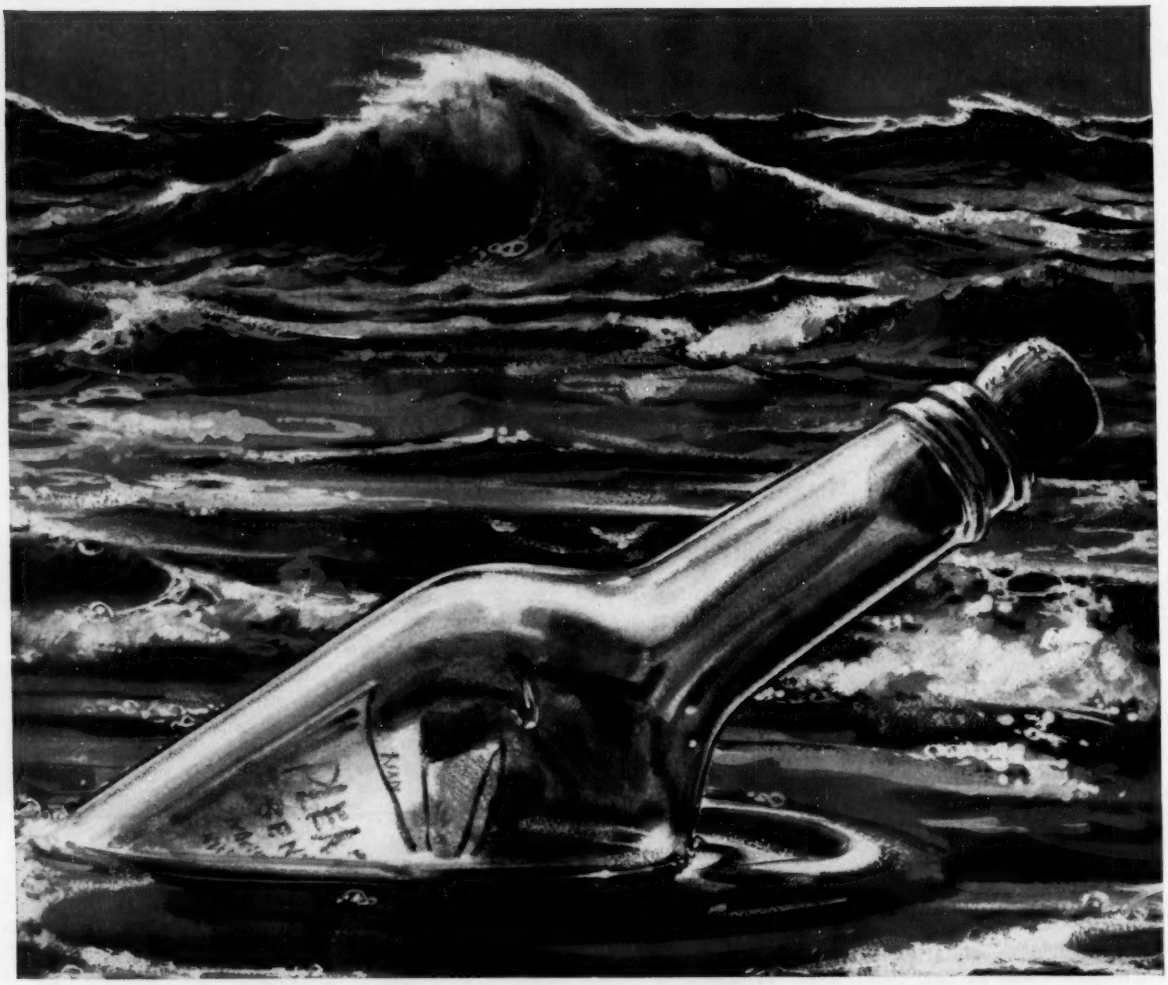
Plastics/France: Etablissements Kuhlmann will float bonds worth $8.7 million, provided stockholders approve on Feb. 17. The capital will be used to help finance an expansion, which will include a new plant—to be built in cooperation with Rhone-Poulenc Co.—for production of polyethylene by the Phillips process. Kuhlmann will also manufacture polyester resins under license from Celanese Corp.

•

Sulfuric Acid/Australia: A new by-product acid plant—the first of its kind in Australia—has undergone successful tests at the Broken Hill Associated Smelters works at Port Pirie. It's designed to turn out 50,000 tons of sulfuric acid annually.

•

Export Ban/Yugoslavia: Starting this month, Yugoslavia will temporarily ban exports of all types of oil, naphtha, artificial fertilizers, sulfuric acid, blue vitriol and some timber products. The edict is designed to strengthen internal markets.



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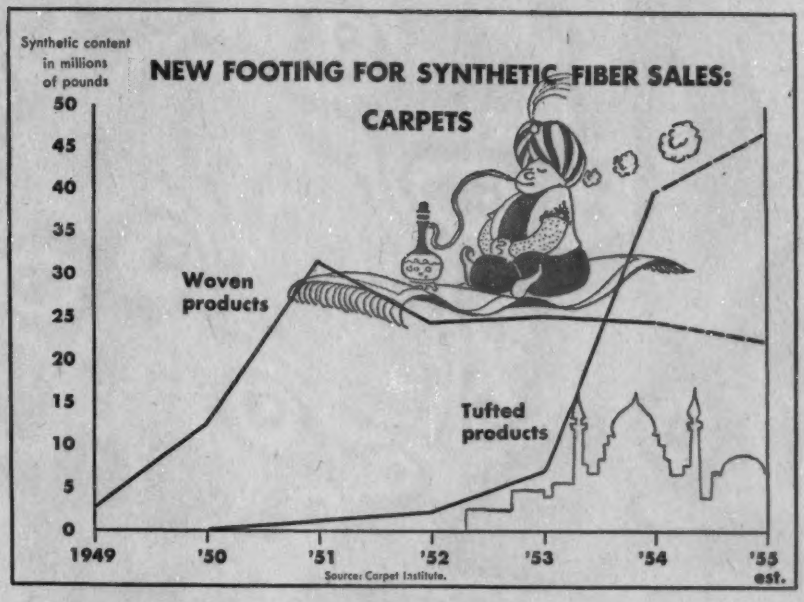
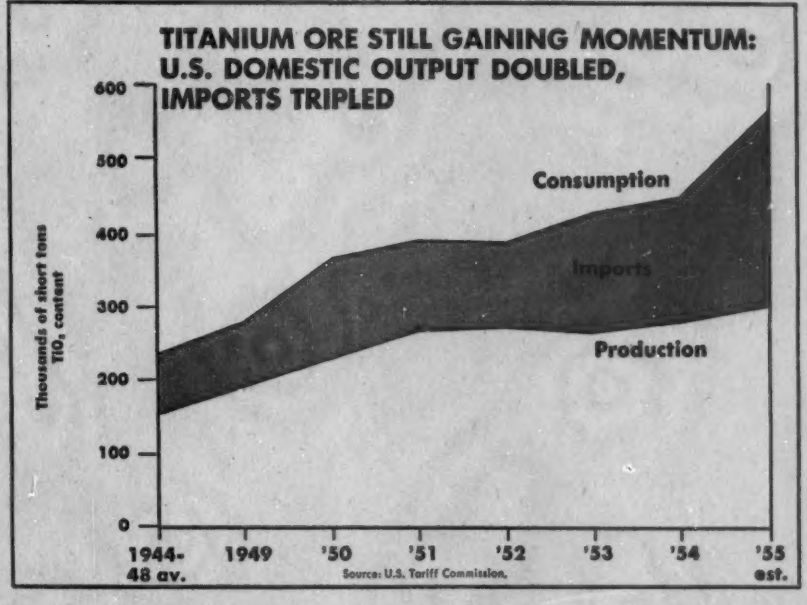
INDUSTRIAL DIVISION
Dept. CW-2, 120 So. La Salle Street,
Chicago 3, Illinois

Charting Business

CHEMICAL WEEK
February 18, 1956



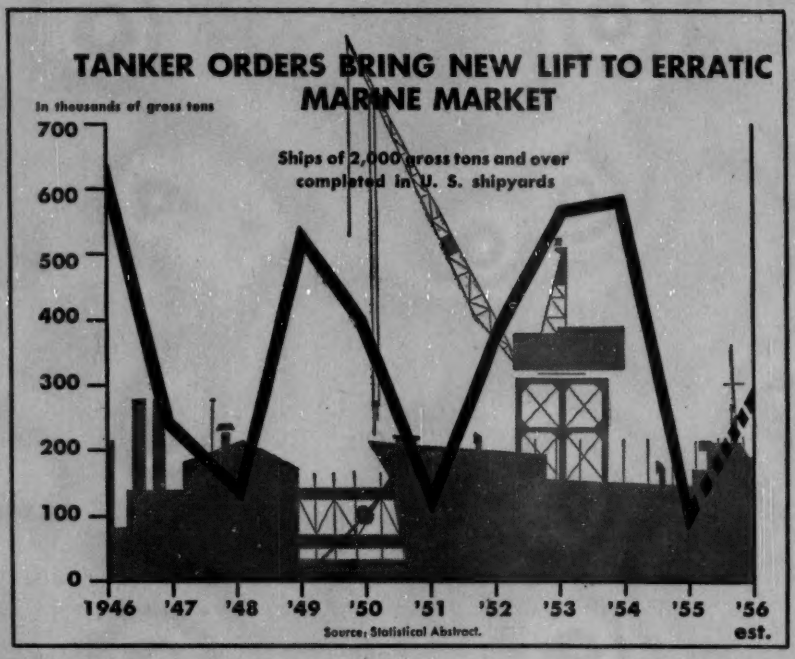
JUST as clothing industry traditions have been toppled by man-made fibers, so old concepts are changing in carpet making as rayon, nylon and other synthetics displace wool and cotton in floor coverings. In 1949, only one firm was making 100% nylon carpets; now there are 20. Among advantages of using artificial fibers: rugs are longer wearing, easier to clean; and makers are less vulnerable to ups and downs of foreign wool production.



NEARLY catching up with domestic output, titanium ore imports—mainly from India, Canada, Australia—now supply about 46% of this country's rapidly rising requirements. Pigments are still the biggest application, but metallic titanium is coming into its own, particularly in aircraft (*see p. 94*).

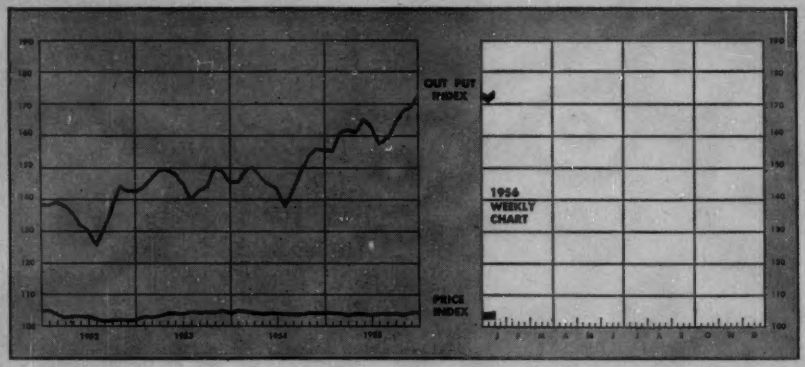
Charting Business

(Continued)



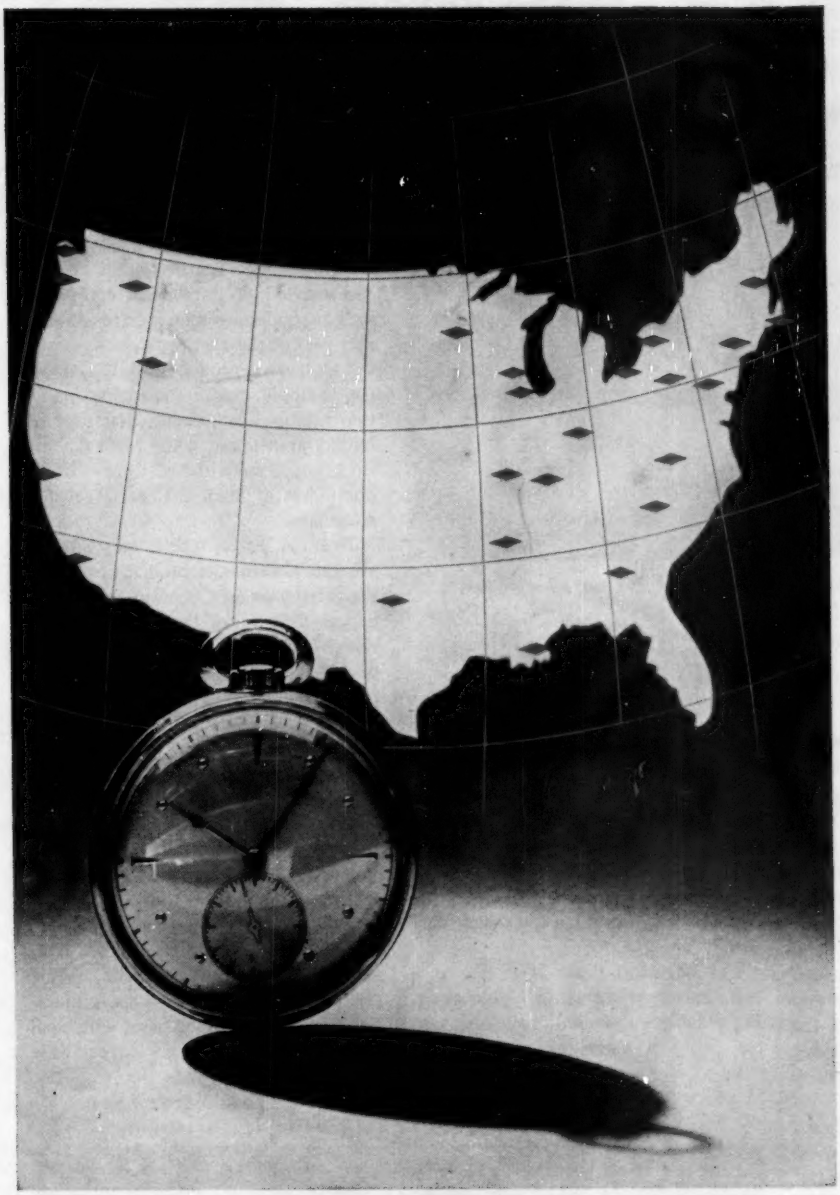
BIG but erratic—that's the market for chemical products at U.S. shipyards. Shipbuilding's on the upgrade this year, calling for more paints, plastics, cleaning and polishing preparations, welding supplies. (Last year, new U.S.-built merchant ships took about 2.85 million gal. of paint.) Major item in this year's program: oceangoing tankers for big oil companies.

BUSINESS INDICATORS



WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100)	180.5	180.0	162.0
Chemical Week Wholesale Price Index (1947=100)	105.3	105.5	104.4
Stock Price Index of 11 Chemical Companies (Standard & Poor's Corp.)	458.7	462.3	367.2

MONTHLY — Trade (in millions of dollars)	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	27,288	27,343	24,097	45,859	45,669	43,265
Chemicals and Allied Products	1,957	2,014	1,764	3,214	3,157	3,013
Petroleum and Coal Products	2,522	2,479	2,287	2,641	2,768	2,643



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Van Waters & Rogers
314 S. Sixth
Chicago, Illinois
Merchants Chemical
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Louisville, Kentucky
Merchants Chemical Company
113 S. 22nd Street
New Orleans, Louisiana
Barada & Page
Maple & Leake Avenues
Baltimore, Maryland
Leidy Chemical
920 S. Eutaw
Springfield, Massachusetts
Chemical Corporation
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Minneapolis, Minnesota
Merchants Chemical Company
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George Mann & Company
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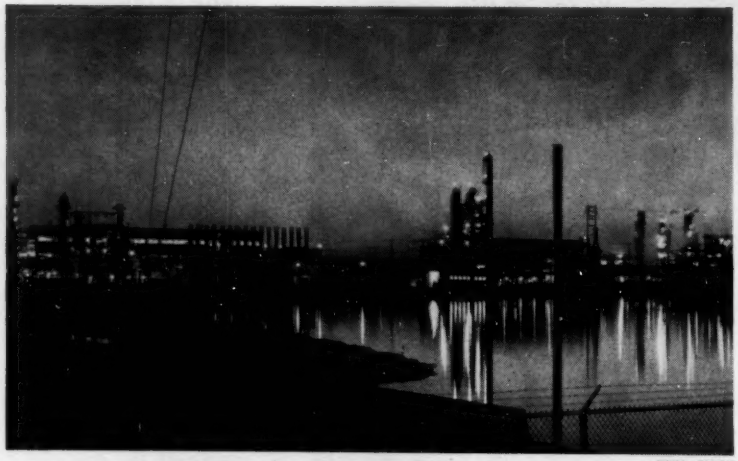


WIDE WORLD

CHEMICAL CONSUMERS: After the battle, an eye on de-regulated . . .

Gas Prices: What Next?

The Harris-Fulbright bill, whose stormy passage through the Senate last week touched off charges of big-deal lobbying, seems certain to affect chemical firms that consume natural gas. Consensus among users: prices are going up, particularly on gas delivered through interstate pipelines.

To what degree price rises will change the competitive positions of gas-using chemical plants near to and distant from the gas fields in the Southwest is difficult to predict now; and few management men queried by *CW* would hazard a guess.

What the bill will do—if it's signed by the President—is to relieve most natural gas producers from Federal Power Commission rate-setting jurisdiction, while retaining commission control over interstate pipeline charges. In effect, FPC will permit pipelines to pay producers only a "reasonable market price," thus providing indirect control over producer prices, since FPC can sanction or veto prices pipelines pay in a given contract.

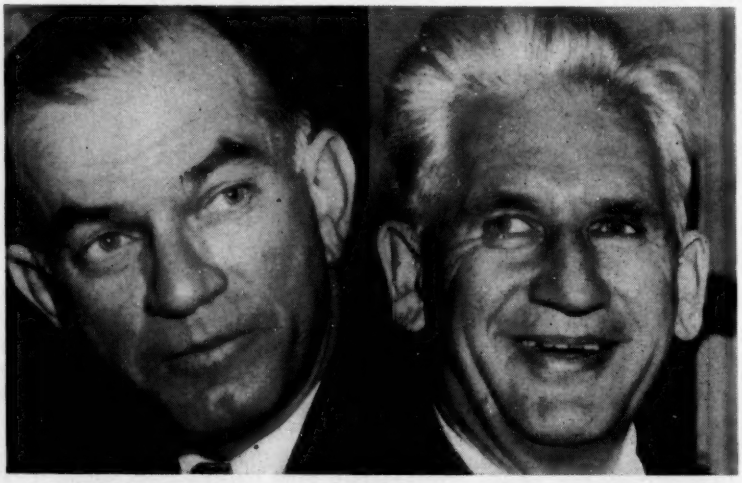
Where They Hit: Most serious impact of price hikes would be upon outlying chemical producers relying on gas as a raw material, since such companies usually have a high investment in conversion or extraction equipment. But most of them say they can absorb reasonable increases, or use alternative ways to get raw material. Says one Texas plant manager: "If prices go high enough, we'll bring by-product hydrogen by pipeline or go to some other raw material. However, the price will have to go up considerably for us to justify the changeover, because half our total equipment investment is for making hydrogen from gas."

For chemical firms using gas as a fuel, higher prices mean higher costs. But plant managers who've looked into the problem claim gas rates would have to climb mighty high—as much as 35 or 40%—to justify conversion to another fuel. Moreover, several are in the enviable position of being equipped to heat with either gas or oil, depending on price and availability.

Regionally, the change in rate-setting jurisdiction will have some effect, though chemical firms again are not too worried. A number of companies in gas-producing states have already met part of the cost problem by securing their own producing outfits. Dow, for example, has a producing operation in Rio Vista, Calif., that supplies its bay area plant, while Shell Chemical gets gas from the platform drilling operations of Shell Oil and Tidewater Associated.

In other states, whose only sources are the pipelines, chemical processors are relying on FPC's indirect controls, expect little more than gradual price rises, further contend that gas producers should be permitted better prices to encourage adequate supplies. This was a major point of the bill's advocates: that if FPC policing continued, Northern consumers might find themselves blessed with low rates but no gas.

How high prices will go, no one can say. The dire threats of Sen. Paul Douglas (D., Ill.) that consumers would generally pay an additional $600-$900 million annually, are considered extremely pessimistic. Some gas hikes, observers say, are unquestionably in the offing. But chemical companies relying on gas expect little immediate impact on the industry, foresee no drastic effects.



FULBRIGHT, DOUGLAS: In Senate arena, big interests and low rates.

At last...the solution to

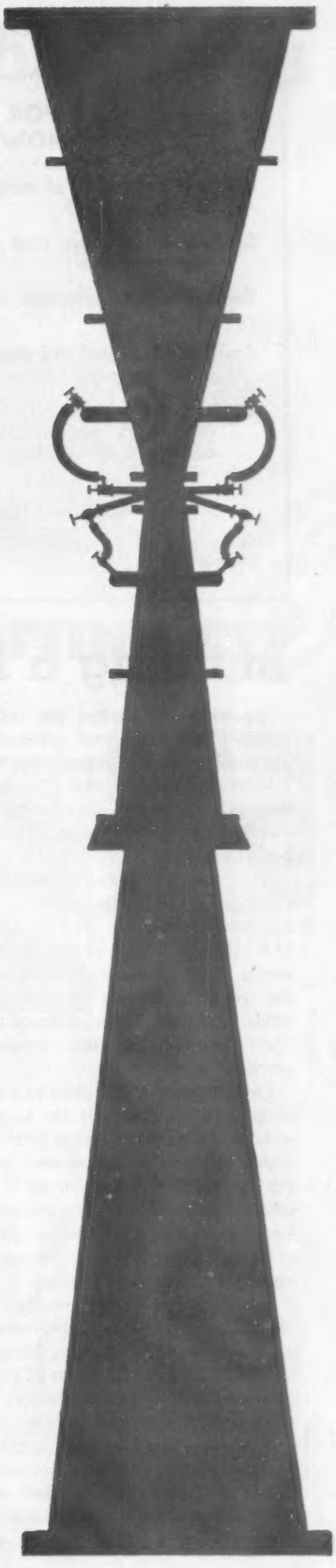
really tough gas-cleaning problems

Sub-micron fumes are the **really tough** gas cleaning problems. These fumes cannot be economically or effectively controlled by conventional cleaning devices.

However, the Chemico P-A Venturi Scrubber is proving its success in solving these **really tough** problems in more than 150 commercial installations and in more than 70 pilot investigations.

The table lists some of these commercial installations. All of these **really tough** problems and many more are being solved with complete satisfaction to users of P-A Venturi Scrubbers.

PROCESS	DUST OR FUME	INSTALLED CAPACITY CFM
Incinerator—Flue Fed	Fly Ash	32,000
Incinerator—Sodium Disposal	Na_2O	9,000
Incinerator—Industrial	Radioactive Dust	6,000
Dry Ice & CO_2 Plants	Amine Recovery	72,400
CO_2 Gas for Process	Fly Ash	500
Boiler Flue Gas	Fly Ash & SO_2	4,300
Enamel Frit Furnace	Dust & HF	11,900
H_2SO_4 Concentrator	H_2SO_4	49,800
Copperas Roasting	H_2SO_4	34,250
Cobalt Ore Roasting	H_2SO_4	65,000
Chemico Wet Type Acid Plant	H_2SO_4	41,000
Chloro-Sulfonic Plant	H_2SO_4	600
Phosphoric Acid Plant	H_3PO_4	91,900
Phosphoric Acid Concentrator	H_3PO_4	194,000
Phosphor Copper Furnace	H_3PO_4	15,000
Smelting—Non-Ferrous		
Blast Furnace	Lead & Organic	12,000
Reverb. Furnace	Lead Compounds	23,500
Comb. Blast & Reverb.	Lead Compounds	7,000
Brass Furnace	Zinc Oxide	7,500
Ajax Furnace	Beryllium Fumes	4,000
Steel Plant		
Oxygen Steel Process	Iron Oxide	140,000
Blast Furnace	Coke & Iron Oxides	788,000
Zinc Sintering	Zinc Oxide	75,000
Wood Distillation	Tar Products	3,500
Na_2SiF_6 Dryer	SiF_4 & Dusts	700
Iron Chloride Concentrator	$FeCl_2$ & HCL Mist	40,000
Unknown	Carbon Black	1,700
Lime Kiln	Lime & Na_2O	18,000
Detergent Spray Dryer	Chemical Fume	250,000
Furfural Residue Burner	Fly Ash	36,000
Nodulizing Kiln	Manganese & Lead	25,000
Aluminum Pot Lines	Tar Fog, Fluorides	40,000
Carbide Furnace	Metal Oxides	1,000
Asphalt Plant	Rock Dust	80,000



Write to our P-A Sales Department for Bulletin M-102 describing the simple operating principle of the P-A Venturi Scrubber, and Bulletin M-103 explaining its metallurgical fume applications in the steel industry.

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CC 307

TAB FOR NEW SCHOOLS — HOW IT'S SPLIT UP

Estimated number of new classrooms needed in U.S. by 1960	476,000
Estimated average cost per classroom (at current prices)	$30,000
Total school construction bill by 1960 at current prices	$14.3 billion
Amount of federal aid proposed for grants and loans through 1960	$2 billion
Amount to be raised through 1960 by states, cities and local school districts for school construction — and this is . . .	$12.3 billion

Where Reynolds Can Help

Estimates based on figures compiled by U. S. Dept. of Health, Education and Welfare.

Building a Better Climate

Squaring off against one of the nation's biggest current problems, a chemical process company this week is working out a plan that it hopes will help produce—on a nationwide scale—a better economic and social climate for years ahead.

The company: Reynolds Metals Co. (Richmond, Va.); the offer: to help any and all school districts in the U.S. build all the additional classrooms they need—with or without the use of aluminum or other Reynolds products, and without any "cut" or fee for the company's services.

Louis Reynolds, executive vice-president, says his firm will act as agent without charge, will arrange financing, design and construction of each building according to specifications of the school district. Moreover, the company has stressed that it will tie no strings to the offer, won't pressure anyone to use aluminum in the buildings.

How It Grew: Though possibility of dwindling construction programs in the South prompted the idea, Reynolds has carried it into the realm of public service, points out that industry has know-how it can and should share with school authorities without charge. The company's claim: school boards should do what industry has been doing for years, i.e., build, sell and lease back for a period of time, with lease payments applied to purchase price.

Designed primarily for public school needs, the program can be extended to private and parochial schools. As seen now, it calls for ownership of the buildings by the financing sources, which will lease them to the school districts over 30 or 40 years. Lease payments would apply to the purchase price of the school, and at the end of the period the district would own the building.

Planning for the venture has produced problems, prime among them the wide variance of state laws concerning financing procedures. But planning committees are working hard on this angle. Says Reynolds, "Leases which the districts will be asked to sign will be submitted to the controlling state agencies. We can provide a building for any district, built to its own specification, in a shorter time than anybody else. The finance companies, builders and designers are ready to go."

Who'll Run It: Administering the plan for the company is University of Virginia Education Professor Bobbie Joe Chandler, a man with wide experience in the field. As Chandler sees it, the plan has two basic aims:

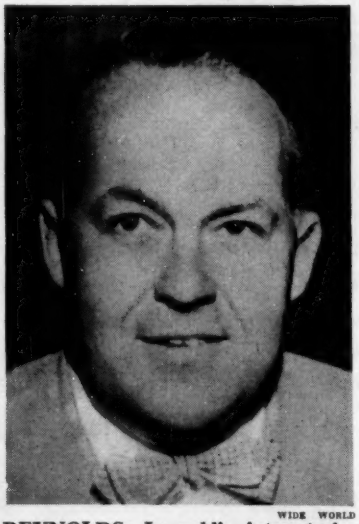
- To produce educationally desirable structures.
- To get them up as economically —and in as short a time—as possible.

To meet these goals Reynolds planners are thinking in terms of modular coordination, where each building segment is a multiple of basic units, assembled in a variety of combinations. This system, designers believe, makes possible mass production of essentially standardized parts, with resulting cost savings.

Legal Angles: From the public standpoint, research is well under way on the status of various state laws governing sale, purchase, lease and rental of school properties, since some states would undoubtedly have to amend laws and regulations laid down for school administration. But Reynolds thinks the area of opportunity for participation without legal entanglements is large enough to keep planners busy for a long time. Requests for detailed information have come from more than 30 states so far.

Reynolds expects that the plan will "dovetail with whatever federal school program is adopted." The plan, he adds, is in no way competitive with any federal or local school construction program, would cost school districts no more than half as much as conventional bond financing, and would fit the laws of any state.

That the nation's sagging school facilities need help from all quarters is widely accepted. And educators, consumers and industry alike will be watching for results from Reynolds' program.



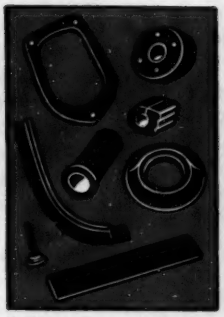
WIDE WORLD

REYNOLDS: In public interest, industry should share its know-how.

In over 100 places, Enjay Butyl rubber parts

add to Pontiac performance

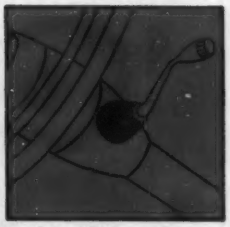
Axle bumper



Body seals, gaskets, insulators, pads, grommets, etc.

Brake and accelerator pedal pads, bellows

Radiator and heater hoses, ducts



Gearshift lever cover

Pontiac has been using parts made of Enjay Butyl since 1946. The great '56 model now incorporates more than 100 parts made from this super-durable rubber, adding to its performance, style and value. These parts have amazing resistance to deterioration and will easily last the life of the car.

Among the many advantages of Enjay Butyl are *price* and *ready availability*. And it is now available in non-staining grades for white and light-colored parts. Extensive laboratory and testing facilities are at your service. For the full story, contact the Enjay Company today.

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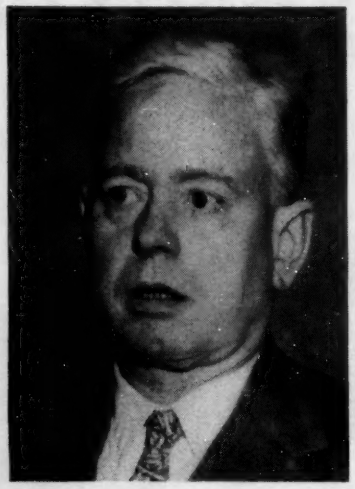


PARKHURST: In long-range planning, he urges research-financial link.

Distant Planning Formula Wanted

To chemical companies, long-range planning is logical, it's desirable, it's even necessary—but don't try to carry it too far.

That seems to be the consensus in industry management this week, judging from remarks of chemical company executives at Stanford Research Institute's recent industrial economics conference on "Company Planning and Technology," a two-day meeting last fortnight in Los Angeles.

As Oronite Chemical's George Parkhurst put it, there's nothing wrong with long-range planning itself. "The vice," he went on, "is rather one of having the planning process too centralized, too detailed, too rigid."

Not All Growth Planned: And with disarming candor, J. Peter Grace —whose W. R. Grace & Co.'s planning has resulted in the firm's chemical interests increasing from 3/10 of 1% of total assets in 1945 to 54% now—backed him up on that point. "When an industrial leader talks of planned growth," Grace said, "he's not being entirely frank. Business growth requires leaving some room for what we call healthy opportunism."

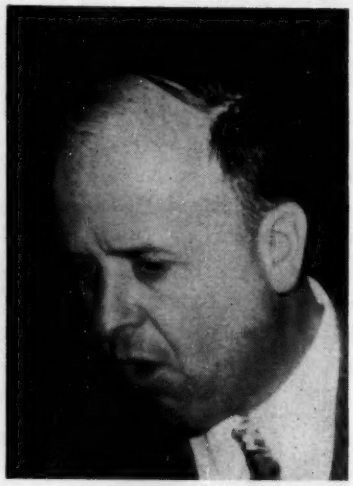
So also says Thomas Vaughn of Colgate-Palmolive, who notes that a company may find that its facility requirements have increased by as much as 40% by the time it completes a given expansion plan. "The solution," he told the more than 500 delegates from industry and finance, "is to plan as best one can for proper growth, but so design as to permit fully integrated incremental expansion of the basic structure at later dates."

Industry — and particularly large companies — must take into account national and international developments in charting a future, declared Crown Zellerbach's Dean Bowman. Bowman — whose company's long-range planning includes 80-year tree-cutting schedules—suggests that industrial planners be equipped with trend projections of such factors as gross national product; composition and location of labor force.

Closer Links Needed: It goes without saying that all corporate planning should be coordinated; but Parkhurst holds that there should be particularly close linkages in these instances:

- Research should be interlocked with capital expenditure planning, and capital expenditure should be interlocked with financial planning.
- Organization planning should go hand-in-hand with manpower planning and with "that most important facet of manpower planning known as executive development."

Executive development, Parkhurst feels, is one exception to this generalization: "In most parts of the chemical industry, technological advances are so rapid and have so many interactions that planning more than about five years ahead is not usually feasible or profitable."



GRACE: No knocker of planning, but a believer in 'healthy opportunism.'

P&G'S McELROY: No guarantee on wages, but 48 weeks of work.

GAW Rejected; Alternates Picked

No carbon copies of last June's automotive industry GAW* plans are being prepared by the makers of chemicals and allied products.

But two entirely different—and possibly more realistic—plans to enhance employees' economic security are being pioneered by two large makers of soaps and detergents. If these plans work out well at Procter & Gamble and at Colgate-Palmolive, it's not unlikely that other chemical process firms will be adapting these schemes to suit their own requirements.

While the Colgate plan is new, the P&G "guaranteed employment" program has been in continuous operation since 1923. It's been attracting public attention since last summer as a contrast with the auto companies' GAW provisions. And though many management people have been openly critical of the Ford and General Motors schemes, the P&G plan has proved its workability through several layoff periods—notably the depression year 1932.

Stimulus for Scheduling: Both P&G and Colgate plans serve as a stimulus for scheduling operations fairly evenly throughout the year, thus tending to eliminate the need for layoffs and layoff pay. On the other hand, the Ford plan calls for employee benefits to be paid out of a fund that's entirely separate from the company's own moneys, and so there's less incentive for auto management to cut down on number of layoffs.

Colgate's new plan—drafted last month in contracts with three different labor unions and covering nearly 4,500 employees at three plants—is said to be the first major layoff pay plan negotiated in the chemical industries. Company President William Sims II says the plan will apply to all employees who've worked through 24 of the 30 months preceding a layoff period.

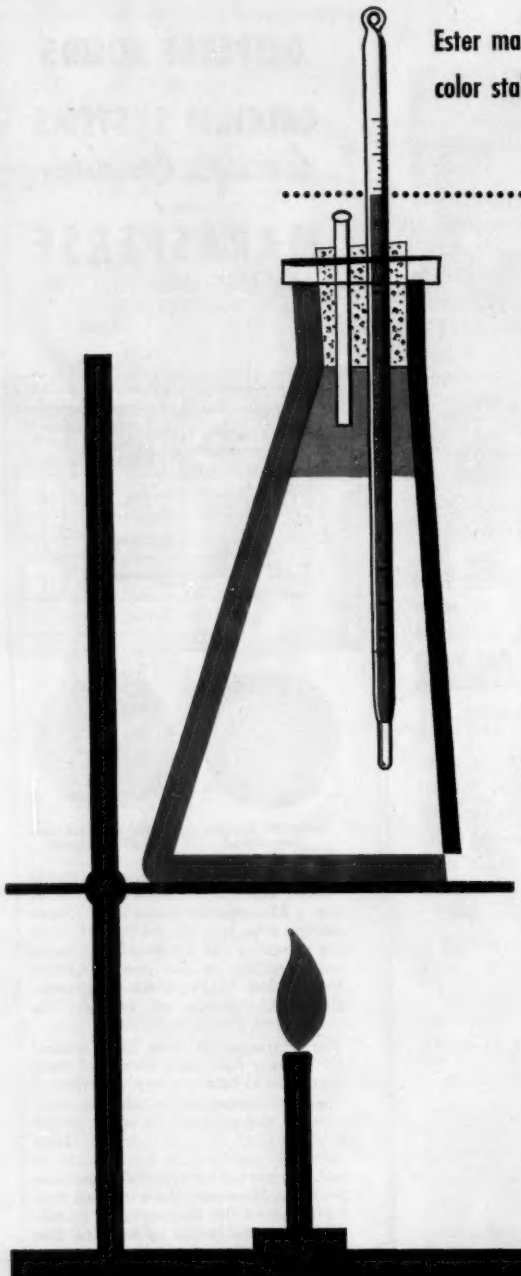
Each eligible employee who's laid off will receive a special payment equal to one week's base pay—defined as 40 hours at regular wage rate—for each year of company service. Thus if a 10-year employee were laid off, he'd get 10 weeks' pay. But if he were recalled in, say, five weeks, then he'd have to pay back half of that layoff payment. This would be done through 10% deductions from weekly pay checks.

No Wage Guarantee: P&G's plan, says President Neil McElroy, "called for a radical revision of our selling, manufacturing and warehousing policies." Those changes were made with considerable difficulty, but now, he affirms, "as we look back over the 32 years during which the plan has been operating, we believe in it more strongly than ever."

P&G makes no attempt to guarantee wages, but it does undertake to assure

COLGATE'S SIMS: Layoffs may come, but the blow will be softened.

*Guaranteed annual wage.



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In a series of comparative processing tests, esters prepared from Neo-Fat Pressed Stearics showed a minimum color change. The peroxide index, measuring the amount of oxygen absorbed, also remained constant. Even after a year of storage, Armour Pressed Stearics show no odor development —no breakdown due to rancidity. This superior stability, plus the lighter initial color of Armour Stearics means higher quality esters for you. The guaranteed constant composition of Armour Stearics means your esters will maintain their uniform, superior quality.

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every eligible employee of 48 standard work-weeks in every year. Every hourly paid employee who has worked 24 consecutive months is eligible. Safeguards for the company include the right to shift employees to other jobs if necessary, and the right to reduce the guarantee to 75% of the standard work-week.

Besides watching the workings of the various company plans for supplemental unemployment benefits, chemical management might well keep an eye on two proposals for state action in this field: Michigan's Gov. G. Mennen Williams is calling for a substantial increase in unemployment compensation rates, and Rhode Island legislators Joseph Weisberger and Harry Asquith are suggesting a state-operated fund to supplement unemployment compensation. In both cases, the money would come from additional levies on employers' payrolls.

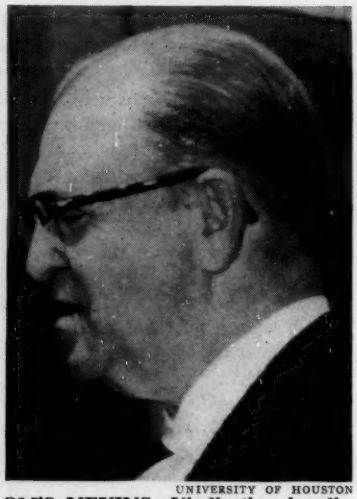
LEGAL

Housekeeping Liability: Chemical companies stockpiling materials or equipment without guards or enclosures are targets for lawsuits, it's indicated by a recent opinion from New Jersey Superior Court. The court reversed an earlier opinion favoring Natural Products Refining Co., said the firm was liable for injuries sustained by a small boy who broke his leg while playing on a large refuse pile accumulated by the company. Opined the court: "There is no place for the assumption in law that any particular child, in the absence of conclusive evidence, has shed his immaturity at any particular age . . . the risk of foreseeable injuries to children (should) be borne by those best able on the whole to prevent them."

In a similar suit in Chicago, brought against Petoskey Cement Co., the

For Minerals in the Mountains

FUTURE SOURCES of metallic ores and inorganic chemicals may be uncovered by this adventurous project in the Himalayan Mountains of Nepal, between India and Tibet. A Swiss geologist, Toni Hagen (*right*), is heading up a survey—sponsored by the United Nations—of Nepal's mineral resources. Out for months at a time in jungles and mountains, Hagen's group is gathering detailed data for a geologic map of Nepal that's expected to be ready by early '57.



UNIVERSITY OF HOUSTON

OM'S NEVINS: Vindication by dismissal may discourage price suits.

father of two children says his son was drowned and his daughter injured when they fell into a river after being attracted to an unfenced sand pile and a loose donkey kept on the company's waterfront premises. The father is asking $45,000 damages.

•

More Proof Needed: A buyer-seller lawsuit over superphosphate price schedules has ended in a way that may well discourage other fertilizer mixers from filing similar suits against phosphate producers and suppliers. A U.S. District Court in Arkansas has dismissed a $280,000 damage suit against Olin Mathieson Chemical Corp. brought by Arkansas Plant Food Co. Plant Food filed suit last April, charged that Olin Mathieson had forced the firm to pay higher prices for superphosphate than those charged other purchasers, in violation of the Robinson-Patman Act. OM Vice-President S. L. Nevins says the dismissal (with prejudice) by agreement is a vindication of OM's practices and position in the matter, reports that Plant Food attorneys admitted they could not sustain the charges.

•

What Price Antifreeze? Pricing below "fair trade" agreements is under fire in two more states. Du Pont (Wilmington, Del.) is involved in both cases in which distributors seek to sell Du Pont antifreeze below the fixed prices agreed to under "fair trade" contracts. In Kansas, Quality Oil Co. (Topeka) is challenging the state "fair trade" law's nonsigner clause, contending it violates the state constitution in several respects and denies the company of its property rights without due process of law. Du Pont last year sought to stop Quality from underpricing, but the Federal Court said the issues involved provisions of the state constitution, should be heard first by the state courts. On another front, Si-Lo Home Furnishing Co. (Philadelphia) has asked for modification of a consent decree that called for Si-Lo to maintain the sale price of antifreeze. Si-Lo contends the "fair trade" laws of Pennsylvania require Du Pont to take back surplus antifreeze or allow Si-Lo to dispose of it at a discount price.

•

A Way Out: Judicious out-of-court settlements are providing many a chance to avoid high-damage jury trials in liability cases. A St. Louis woman recently settled for $35,000 of her hoped-for $200,000 in an out-of-court agreement with Wilson Keith and Co. (a pharmaceutical producer), Universal Match Corp. and Laclede Gas Co. The woman suffered injuries when she was hit by debris from a wall blown down by an explosion at Wilson Keith. Though trial before a jury had already started, settlement was made two days after opening.

Observers believe this will lead the way to out-of-court settlements in many of the remaining 33 cases resulting from the explosion.

LABOR . . . . . .

Merger on Trial: Chemical management is watching two plant elections and two jurisdictional disputes this month for latest evidence on what difference the recent AFL-CIO merger will make on performance and behavior of affiliated labor unions. As of this week, it appears that there's still a lot of interunion friction despite all the unanimity that seemed to prevail at the merger convention in New York.

At Niagara Falls, N.Y., two AFL-CIO unions are clashing head-on in a representation election at the Carborundum Co.'s Niagara, Globar and Wheatfield plants. Seeking to represent the salaried clerical and technical employees at those plants: Howard Coughlin's Office Employees' International Union and O. A. Knight's Oil,

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But many modern industries have discovered that ALCOA Aluminas are very special "best buys," regardless of price. They've found that wherever these versatile aluminum oxides are used, product quality is enhanced, performance is stepped up, processing is more easily controlled.

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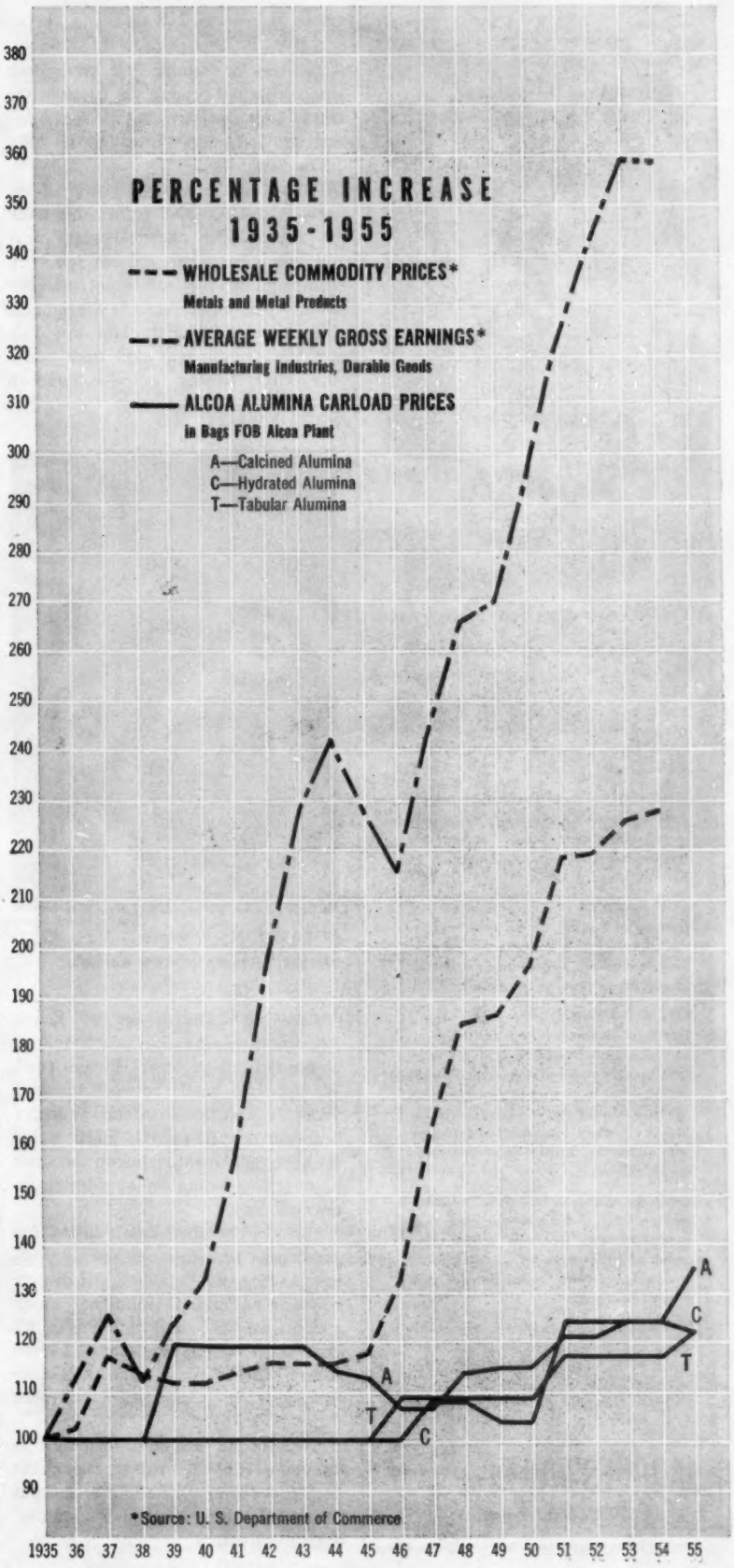
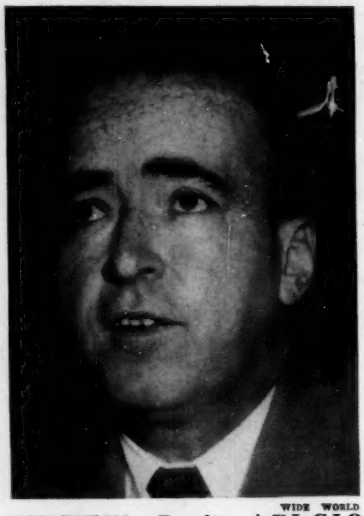


Chemical & Atomic Workers. Both unions started organizing drives at the three sites last year before the union merger and neither is willing to withdraw now.

A test of the drawing power of the new AFL-CIO label comes this week at the Spencer chemical plant near Orange, Tex., where OCAW has been campaigning for the votes of 163 hourly paid employees. At a neighboring Allied Chemical plant last fall, OCAW—running at that time under the CIO banner only—suffered a nearly 3-1 setback.



WIDE WORLD

COUGHLIN: Despite AFL-CIO merger, a clash of two unions.

Delaying construction at Kaiser Aluminum & Chemical's $200-million aluminum plant near Ravenswood, W. Va., is a hassle between the Iron Workers and Sheet Metal Workers, both of the AFL-CIO. Each union claims employment rights on the work of installing siding on an administration building.

Outside the chemical industry but providing the first clear-cut post-merger case of a jurisdictional dispute between an ex-CIO industrial union and an ex-AFL craft union is a tiff involving Walter Reuther's United Auto Workers and the AFL-CIO Building & Construction Trades Dept.

Question in all these disputes: is the new AFL-CIO strong enough to keep peace among its affiliates and put backing behind member unions' organizing drives?

Pile up on Patents

Chalk up two more U.S. tetracycline patents in the already complex tangle of patents and patent applications on this commercially and medically potent broad-spectrum antibiotic.

Both have been issued to American Cyanamid, whose Lederle Laboratories Division is one of the three U.S. producers. U.S. Pat. 2,731,497 covers the dechlorination process (with palladium hydroxide catalyst) that's being used by Lederle. This technology is also being shared by Pfizer under a 1954 cross-licensing agreement. U.S. Pat. 2,734,018 covers a direct fermentation process that had already been licensed to Bristol Laboratories.

Bristol—which makes the product for Upjohn and for Olin Mathieson's Squibb Division as well as for itself—seems to feel its position in the court fight has been bolstered; but Pfizer insists its patent is basic, regardless of process used.

KEY CHANGES . . .

J. B. Morningstar, to vice-president, Morningstar, Nicol, Inc. (New York).

Frank C. Ware, to executive vice-president, Aetna Oil Co. (Louisville).

Myron B. Diggin, to vice-president and director, Hanson-Van Winkle-Munning Co. (Matawan, N.J.).

James C. White, to board chairman, and **William S. Vaughn,** to president and director, Eastman Chemical Products, Inc. (Kingsport, Tenn.).

J. C. Weithaus, to director, Hagan Corp. (Pittsburgh).

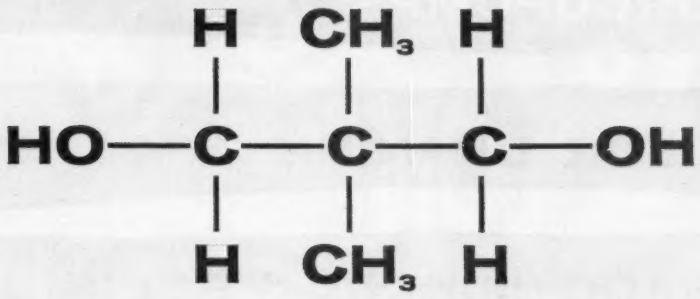
Henry H. Hausner, to general manager, Nuclear Engineering Division, Penn-Texas Corp. (New York).

Henry C. Goodrich, to vice-president, Rust Engineering Co. (Pittsburgh).

A. Lee Powell, to board chairman, and **Prior J. Rooney,** to executive vice-president, Turpentine and Resin Factors, Inc. (Savannah, Ga.).

DIED . . . . . .

John Watson Teter, 48, director catalysis research, Sinclair Research Laboratories, Inc. (Chicago), at Chicago.



In the production
of polyester resins and plasticizers
and as a polyurethane intermediate

neopentyl glycol

builds stability into the molecule

DATA ON EASTMAN NEOPENTYL GLYCOL

Characteristics:
Short chain length
Symmetrical
Reactive

Typical Properties:
Form
Crystalline Solid
Color
White
Melting Point
124 130°C
Purity
96% Minimum

This new Eastman isobutyraldehyde derivative offers the resin formulator a compact, symmetrical molecule with two methyl side groups. Thus, the use of neopentyl glycol in the production of polyester resins and plasticizers results in improved all-'round stability with excellent resistance to thermal degradation and hydrolysis.

Neopentyl glycol should be investigated either alone or as a modifier of other di- and polyols in the manufacture of polyurethane type polyester intermediates. Ethylene oxide reacts readily with neopentyl glycol to yield polyethers which also show promise as raw materials for polyurethane resins. The two primary hydroxyl groups in neopentyl glycol exhibit excellent reactivity, and polyesters prepared from it appear to impart their own stability to the polyurethanes made from them.

We invite you to send for samples and find out for yourself the advantages neopentyl glycol can give to your product. Write us at Kingsport, Tennessee.

Eastman CHEMICAL PRODUCTS, INC.,
KINGSPORT, TENNESSEE, subsidiary of EASTMAN KODAK COMPANY

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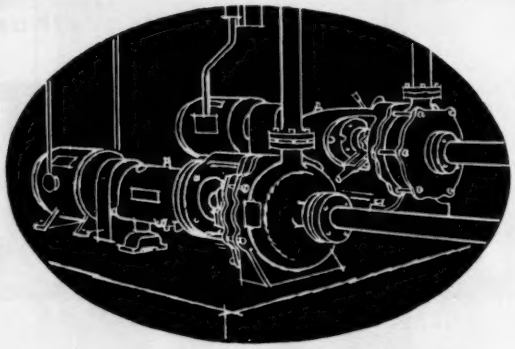
DURCOPUMPS WERE SELECTED

FOR URANIUM PROCESSING AT

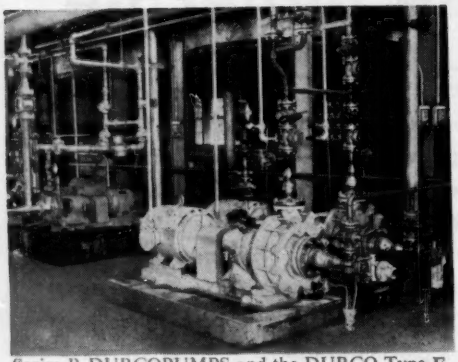
ELDORADO MINING & REFINING, LTD.,

PORT HOPE, ONTARIO, REFINERY.

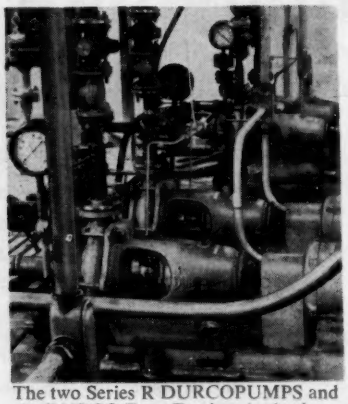
Series H Durcopump



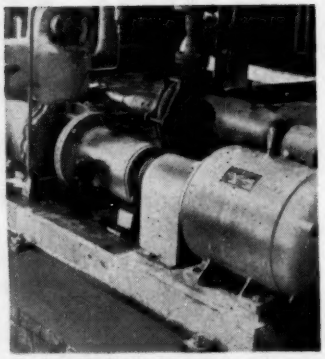
Series R Durcopump



Series R DURCOPUMPS and the DURCO Type F valves in the foreground handle a slurry containing acid insolubles, metal nitrates, and free nitric acid. Another Series R DURCOPUMP (background) handles nitric acid filtrate.



The two Series R DURCOPUMPS and the DURCO Type F valves in the foreground handle scrub liquor with up to 1% nitric acid. The DURCOPUMPS in the rear handle a raffinate slurry containing metal nitrates, acid insolubles, and free nitric acid.



Series H DURCOPUMP (front) handles a nitric and sulfuric acid slurry, specific gravity 1.8-2.0, with a high viscosity at 175° F. Series R DURCOPUMP in the rear is a filter feed pump handling a neutral slurry.

Eldorado Mining and Refining, Limited, a Crown Company, processes uranium to a Metal Grade Oxide.

DURCOPUMPS and DURCO valves were chosen to provide long service life with minimum maintenance. For complete details regarding this and other DURCO chemical service equipment, contact your nearest DURCO engineer or write

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After the Great Ford Foundation Gift...

What Still Remains To Be Done To Provide Decent Faculty Pay

The Ford Foundation's gift of a half billion dollars to our privately supported colleges, medical schools and hospitals, now being distributed, is magnificent. But it will be much more magnificent if it inspires completion of the job to which it gives a lift. So far as the colleges and universities are concerned, this job is primarily to rescue their faculty members from being second-class citizens economically.

Even in a period when we have become accustomed to astronomical financial figures, a half billion dollars remains an eye-popping gift. In fact, it is so imposing that a good many people who don't read the fine print are apt to conclude that it must just about solve the financial problem to which it is addressed.

Goes Only a Small Way

However, we have allowed college professors to fall so far behind the parade financially that the share of the Ford half billion dollar gift going directly to the improvement of faculty salaries ($210 million) will go only a small way financially toward doing what is necessary to provide adequate salaries.

Completion of this job for our privately supported colleges and universities calls for:

1. An increase in faculty salaries at least five times as great as that made possible by the Ford gift merely to restore salaries to their 1939 purchasing power level and an increase fifteen times as great to provide adequate salaries today.

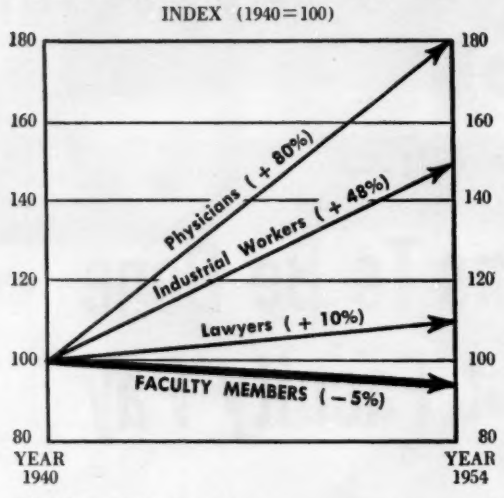
2. Some difficult and courageous decisions by the heads of the colleges and universities in apportioning the grants received by them.

Terms of Gifts to Colleges

The $210 million of the Ford Foundation gift going specifically to improve faculty salaries is being distributed on the following basis: Each of 615 privately supported, regionally accredited liberal arts and science colleges and universities receives a gift about equivalent to its last year's teaching payroll. For ten years only the income from these gifts is to be devoted to raising faculty salaries. After that all the money can be spent in any way the institutions receiving it see fit. There is no requirement that universities having other than liberal arts and science schools limit use of the gifts to improving salaries in these schools alone. They can spread it right through all their faculties if they wish.

In addition to the gift of $210 million specifically directed to increasing faculty salaries, another gift of $50 million goes to a group of 126 institutions selected for specially noteworthy leadership in improving

What's Happened to College Faculty Salaries*



* Real Income before Taxes.

Source: Council for Financial Aid to Education, U. S. Dep't of Commerce: U. S. Dep't of Labor.

the status and pay of teachers. For these schools the individual gifts add about 50% more to the amounts coming from the $210 million fund. They can be used to improve faculty salaries if the institutions choose to do so, but this is not required by the terms of these gifts.

The $210 million plus the $50 million should yield an income of $10-$13 million a year. Even if all this is used to raise salaries, it will be only a small step, however worthy, toward the $200 million per year the colleges need to meet their salary requirements adequately.

Helps Some Who Need It Most

In focussing its gift to improve faculty salaries in privately supported liberal arts and science colleges, the Ford Foundation aims at least part of the help at the spot where it is most desperately needed. Numerous surveys have indicated that the most poorly paid of all college and university faculty members are those in small, privately endowed liberal arts colleges.

But the overshadowing fact is that the teachers in our colleges and universities as a whole are badly underpaid. Just how badly is indicated by the chart above which first appeared in an earlier editorial. (Figures later than those for 1954 are not available.)

The Ford gift will turn the indicator of faculty salaries, which now lies far below the general salary trend, upward a few points. And it will do this in some places where salaries are below the wretched average shown by the chart.

But the Crucial Test Remains

College and university administrators will have the opportunity to extend further the process of getting the help provided by the Ford Foundation gifts where it is most needed. In general, this will mean giving it to senior faculty members, in order to hold experienced teachers and make college teaching attractive as a career. But to make such a division in many schools will take extraordinary fortitude.

The crucial test of the success of the enterprise of the Ford Foundation in raising faculty salaries will lie in whether it prompts the rest of us — college alumni, individuals, business firms and legislators alike — to see that it is a great beginning, not a signal for a recess.

Even with the Ford gifts providing $10-13 million a year, our privately supported colleges and universities must have an increase of about $190 million a year to provide decent faculty salaries.

This is a job far beyond the capacity of the Ford Foundation, imposing though that is. It is a job far beyond the capacities of a few hundred large corporations and a few thousand wealthy individuals. If it is to be done, it is a job at which all of us must work with a will.

C W Report

by Ray E. Heiks and colleagues

Your Future in Nuclear Energy

If you plan to stay in the chemical process industries, put nuclear energy down on tomorrow's shopping list.

Fast, versatile and efficient, it has already proved its potential as a valuable new research and processing tool.

More important, nuclear energy is opening a vast new market for both chemical products and chemical processing ingenuity.

From the day they first loosed the energy of the atom, nuclear scientists have dreamed of diverting this new force into constructive channels. At Geneva last August, some of these dreams were publicly aired, giving chemical men a glimpse of their atom-oriented future. Little of what they saw is yet commercial reality, but much of it is already well beyond the dreaming stage.

Clearly in view at present are prospects of using radiation to initiate chemical reactions, modify chemical products, control manufacturing processes. Then there is radiation for "cold" sterilization, the nuclear energy field as a market for chemicals, and atomic power as a new chemical process industry—particularly in fuel reprocessing.

And as the story continues to unfold, nuclear energy will undoubtedly tie into the process industries in many other ways*. Some of the more significant outlines of this new field are already visible.

Markets

Big new markets are springing up at the heels of this advancing industry. Significantly, these markets are, in large measure, for products developed especially to meet the somewhat unusual needs of the nuclear energy industry itself. Roughly, these opportunities can be categorized as follows:

- Radiation-resistant materials for use in construction and in other applications where materials are subjected to a radiation atmosphere.
- Chemicals involved in the reprocessing of fuel elements.
- Decontamination materials.
- Agents for disposal of radioactive wastes.

The construction of atomic installations requires radiation-resistant plastics, lubricants, fluids, elastomers, corrosion-resistant coatings, special glasses (or other materials for windows), floor coverings and walls (both of which can easily be decontaminated).

Techniques of fuel reprocessing require further development. For economic operation of reactors, efficient methods of separating fission products and other contaminants from the spent fuel elements are necessary. Organic solvents are receiving considerable attention for use in solvent-extraction techniques. Other materials under study are ion-exchange resins and adsorbents (which, of course, must be radiation-resistant). For the most part, chemical requirements of fuel reprocessing must await the selection of the most feasible techniques based on research efforts now under way.

Decontamination and problems of radioactive waste disposal will require still other types of chemicals. Special detergents, cements, adsorbents such as montmorillonite clays, and chem-

*Nuclear power generation—a long story in itself—will only be touched upon here.

icals for crystallization and precipitation of radioactive materials from liquid wastes are all involved here. As the atomic energy program moves forward, it can be expected that markets for chemicals not yet known will be developed.

A New Processing Industry

"The nuclear power industry will stand or fall, economically, depending on the success that chemists and chemical engineers have in developing cheap processes of purifying and refabricating nuclear fuel." This quotation from former AEC Commissioner Henry Smyth clearly points up the importance of fuel reprocessing and waste disposal in the development of nuclear power.

For any given power output, a nuclear power plant costs more than a conventional power plant. A large part of this cost lies in the fuel reprocessing plant. So, one way of bringing costs in line will be through cheaper reprocessing of the fuel for recycle to the reactor.

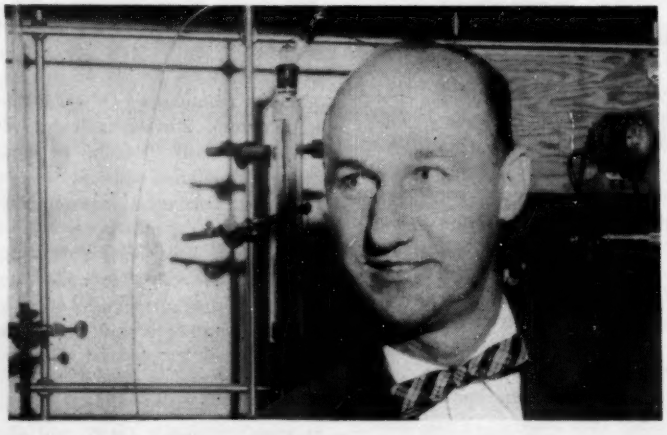
The basic problem is this: in the fission process, a neutron reacts with a fissionable atom such as uranium-235. This reaction produces energy, additional neutrons to maintain the chain reaction, and two fission-product atoms, which soak up neutrons, wastefully. Therefore, as reaction progresses and these species build radiation-absorbing atoms, they poison the reaction and ultimately break the chain, causing the process to stop. Also, the effect of radiation on the fuel elements may cause distortion and other damage that limits the useful life of the element.

The goal of reprocessing is to remove the fission products, recover fuel material in a re-usable form. Processes are known that are probably more than adequate to do the job, but they are costly. Cutting these costs is currently the top-priority problem.

New Concepts: Much of the expense of presently practiced reprocessing methods is inherent in their very nature. Generally, they work like this: a complex, fabricated solid-fuel element is completely dissolved; the chemical elements are separated; then they're purified, isolated and reconverted into usable form (usually metallic). Finally, the whole mechanically complex fuel element must be refabricated. (Imagine the cost of a new automobile if the copper, steel, chromium, and other metals in them were obtained solely by dissolving old automobiles in nitric acid, separating the elements, etc.)

Future economies probably do not lie in improvements of present processes, which are well designed and skillfully executed. Rather, cost-cutting opportunities will be found in entirely different concepts—different schemes for reprocessing. Work is progressing on a number of such new concepts.

- In recent years, researchers have directed a great deal of work to the development of homogeneous and liquid-fuel reactors, wherein continuous reprocessing and decontamination can be built into the cycle much more simply than in heterogeneous solid-fuel reactors. Such a step might call for ion exchangers, solvent-extraction columns, or absorbers. Experimental systems of this type are now being built and operated, but considerable development work still lies ahead before such reactors become commercial.
- For the solid-fuel reactor, a desirable reprocessing method would be one in which the physical form of the fuel element was not changed. For metallic fuel elements, for instance, zone melting may prove useful. Conceivably, the fission poisons might be concentrated in the extremities and clipped off, leaving a fuel element for replacement in the reactor.
- Another focus of investigation is lower fuel element purity. Present processes give a purity of the order of 99.9%; yields of 98% or better are desired because of the high cost of refining raw fuel. As new, cheaper types of fuel elements are developed, it may be profitable to accept a lower purity and lower yield, thereby allowing savings in the reprocessing step. In fact, it may be economically desirable to employ two reprocessing methods simultaneously: one would be inexpensive with relatively lower yields and purity than present processes; the



Meet the Author

RAY HEIKS is a team player. He has been a member (often director) of team projects since joining Battelle Memorial Institute as a research chemist in 1942. This report, too, is a team effort.

While this is Heiks' first appearance in CHEMICAL WEEK, it is not his first venture into public print. He has authored more than a dozen articles, many technical papers.

A graduate of Bluffton College (A.B.) and Ohio State (M.S., analytical chemistry, and Ph.D., physical chemistry), Heiks taught at Marshall College before going to Battelle, where he is now a technical advisor. In this capacity, he helps sponsors formulate chemical research programs.

second would be comparable to present processes. The fuel elements might go through several cycles of the first; and, when contamination reached a predetermined high level, be passed through the second for complete regeneration.

• Another opportunity lies in the development of cheap, pyrometallurgical processes to replace, partly or entirely, the solution processes now in use. In dual processes, as described above, the "inexpensive" process might be pyrometallurgical.

These and other techniques (*see table: Reprocessing Review*) now under serious study have yet to leave the stage of laboratory experimentation.

What to Do with Waste? Closely allied to fuel reprocessing is the problem of radioactive waste disposal. It's a hazardous and costly problem that can only grow larger with the onset of commercialization.

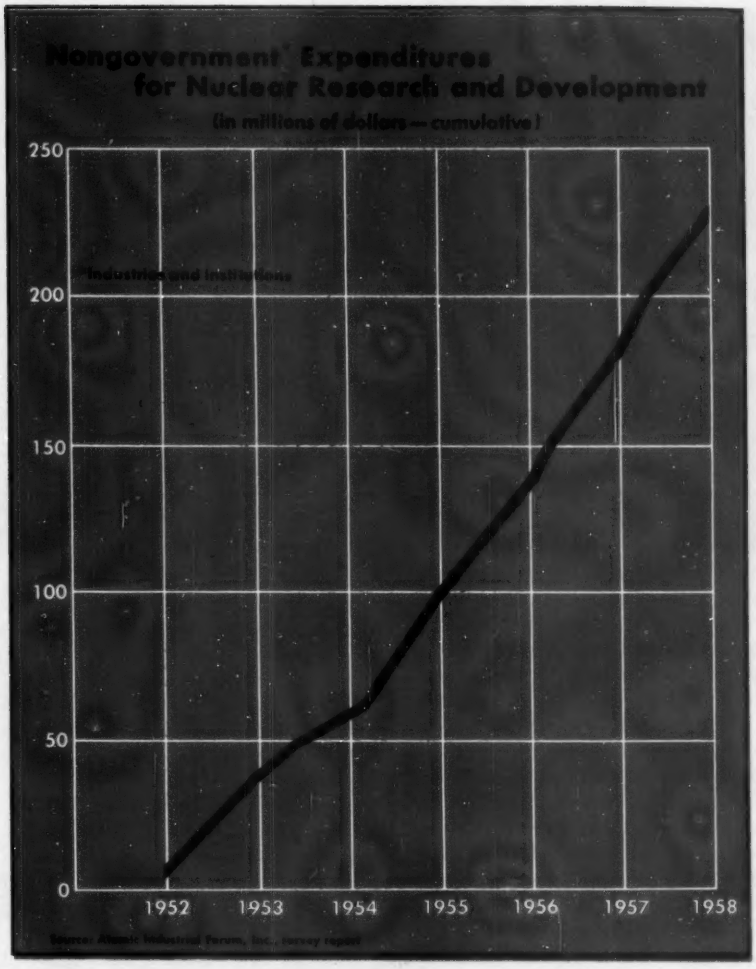
A reactor operating at a power level of 1 megawatt for a year will require the disposal of approximately 1 million curies of fission-product activity. After 10 years, this activity will decay to about 10,000 curies; and after 100 years will still be about 1,000 curies.

Excellent measures are available for disposal of this radioactive waste, but they are strictly temporary. A final solution remains to be found—and it must be found, if nuclear energy is to become a major power source of the future.

At present, several promising disposal methods that appear economically feasible are coming along.

One of these involves the use of montmorillonite clays as adsorbents. The wet clay is extruded in a macaroni press, packed loosely in a column, and the waste solution poured through, as in an ion-exchange column. The clay is fired at high temperature to form a durable ceramic product from which it is difficult to leach the fission products. The major drawback of this method is that the final product must be contained in a restricted area for extremely long periods of time, and it's hard to guarantee the continuity of such containment.

As a preliminary to ultimate disposal, it would be desirable to utilize the radioactivity of the fission product wastes as high-intensity radiation sources in various applications. If fission-product waste sources can be prepared at low enough cost to compete with other radiation sources, it may be possible to make waste disposal pay for itself. Development work along these lines may be highly rewarding, since a successful solution of this problem means lower fuel reprocessing costs and consequently cheaper power.



Applications

The atom has already proved suitable for myriad tasks in the processing field. But nowhere, perhaps, has it advanced so far commercially as in control applications. It can start machines, slow down chemical processes, trace pipeline flow, check the amount of tobacco in cigarettes, measure the thickness of slow-moving sheets of steel or the thinness of speeding sheets of plastic film.

And that's only a small sample of its full potential in this field. One of the earliest commercial uses of atomic radiation, process control is still one of the most significant.

At present, many examples of atomic control tools are available. In general, these can best be broken down by application as follows:

• Measurement of location and motion. In this category fall liquid-level gauges, constant-leveling devices, measurement of rates of sedimentation of one phase in another, and radioactive tachometers.

• Measurement of properties. Specific examples in this category include various types of measurement: total thickness, using transmission techniques; thickness of coatings applied to a base material, using back-scatter techniques; quality-control methods based on detection of density differences and a determination of moisture content.

ATOMIC FUEL—REPROCESSING REVIEW

Process	Bismuth phosphate precipitation	Solvent extraction	Ion exchange	Fractional fluoride distillation	Vacuum distillation	Zone melting	Salt extraction or high-temperature solvent extraction	Electro-refining	Oxidative slagging
Operation	batch	batch	batch	continuous	continuous	continuous	continuous	continuous	continuous
Yield*	Pu-95%	Pu-97% U-99.8%	Pu-97% U-98%	U-98%	Pu-98%	—	Pu-90%	U-98%	—
Status	obsolete	full scale	pilot plant	pilot plant	lab	lab	lab	lab	lab

*Where yields are not given for either Pu or U, the missing element must be recovered by one of the other processes.

• Detection of flaws. The various applications of industrial radiography using X rays are, of course, well known. Atomic radiation can be applied in a similar manner using a variety of gamma-ray emitting isotopes of high intensity and a wide range of energies, noticeably broadening the scope of radiographic detection.

• Tracing of materials. This category includes the use of radioactive tracers to follow the flow of materials through pipelines and complex processing equipment, to determine flow patterns, and to actuate flow-control mechanisms.

In the Lab: Next to control work in terms of immediate significance are the research applications of radioisotopes and atomic radiation. Far too numerous to cover in detail, they include such things as radiography, activation, and isotopic dilution techniques for analytical purposes. But tracer studies are probably the most common research use.

Spurred by the ready postwar availability of radioisotopes, scientists are constantly uncovering new research applications. Radioisotopes are currently working at such diverse tasks as tracing chemical reactions within living cells and following erosion phenomena in hydroelectric turbine blades.

At latest official count (1954), there were more than 750 specific isotope applications in medical research alone. Industrial uses soared from 100 in 1950 to over 1,100 in 1954; the present number is unknown. But even here the full potential has yet to be uncovered.

In the Plant: As far as can be determined, there is now no commercial chemical process that utilizes atomic radiation; but there is considerable research in this field, particularly on radiation-initiated reactions. Soon, no doubt, processing applications will spill out rapidly—overshadowing, chemical men expect, most other aspects of nuclear energy.

Oxidation and reduction of both organic and inorganic compounds, decomposition, condensation, polymerization, halogenation, and various catalyzed reactions are some uses of radiation that are already feasible in the laboratory. In any commercial consideration of the use of atomic radiation to promote chemical reactions, economics must assume a major role, of course.

Because of the present cost barrier, it is quite likely that use of radiation in the foreseeable future will be limited to reactions that cannot be carried out satisfactorily by other conventional techniques, or to reactions in which a chain mechanism can be initiated by atomic radiation. Indeed, the present economic position of atomic radiation is quite discouraging in reactions in which the quantum efficiency is no greater than one. Thus, in the initial research program on any given reaction, quantum efficiency should be determined early in the program.

Up to Research: Atomic radiation is not unique in its ability to initiate chemical reactions. It is well known, for example, that chlorination can be initiated by ultraviolet radiation. But gamma radiation has one important advantage—its ability to penetrate through reaction containers and solid products that often form on the walls of the reaction vessel.

In the photo-activated reaction between nitrosyl chloride and cyclohexane to produce cyclohexanone oxime, for example, brown dioxime deposits on the window of the reactor, absorbing light and reducing the efficiency of the reactions. Because of its much greater penetrating power, gamma radiation from a cobalt-60 source could overcome this difficulty.

Other advantages, such as obtaining unique specificity effects, could result from the use of gamma radiation. Gamma radiation, for example, promotes ring-chlorination of toluene, whereas ultraviolet radiation yields

products in which the methyl group is chlorinated. Just how big a part these unique advantages will play in propelling atomic radiation into the commercial spotlight remains to be seen.

Radiation-induced polymerization has been known since 1920 when acetylene was polymerized by the use of alpha particles. In 1930, more conventional polymers, namely, polystyrene and polyvinyl acetate, were produced through the use of alpha, beta, and gamma rays, as well as neutrons. In 1947, researchers subjected acrylonitrile to X rays, and a free radical type of polymerization occurred, initiated essentially by hydrogen and hydroxyl radicals.

Since then, many polymerization reactions have been effected through radiation. Scientists at Naval Research Laboratory, for example, have used radiation to polymerize acrylonitrile, ethylene, various acrylate esters, silicones, vinyl ethers, vinyl acetate and polyesters. Other researchers have made polyacrylamide and polyethylene. These reactions work in emulsions or dispersions, in the presence of organic liquids, and in bulk. In general, the products differ only marginally from those obtained by more conventional methods (higher melting point and density are the most significant differences).

Considerable attention is being directed toward the use of irradiation on those monomers that are difficult or impossible to polymerize by other means. But thus far, there have been no dramatic developments in this area.

Also of possible significance is the use of "hot" pressure vessels in those reactions where catalysts and high pressures are essential, letting the vessel itself act as the catalyst. Such a gambit would be particularly desirable in the polymerization of vinylpyrrolidone, where the polymer could be secured uncontaminated by loose catalyst fragments. When polymers require high purity, as in medical applications, this procedure could offer unique advantages.

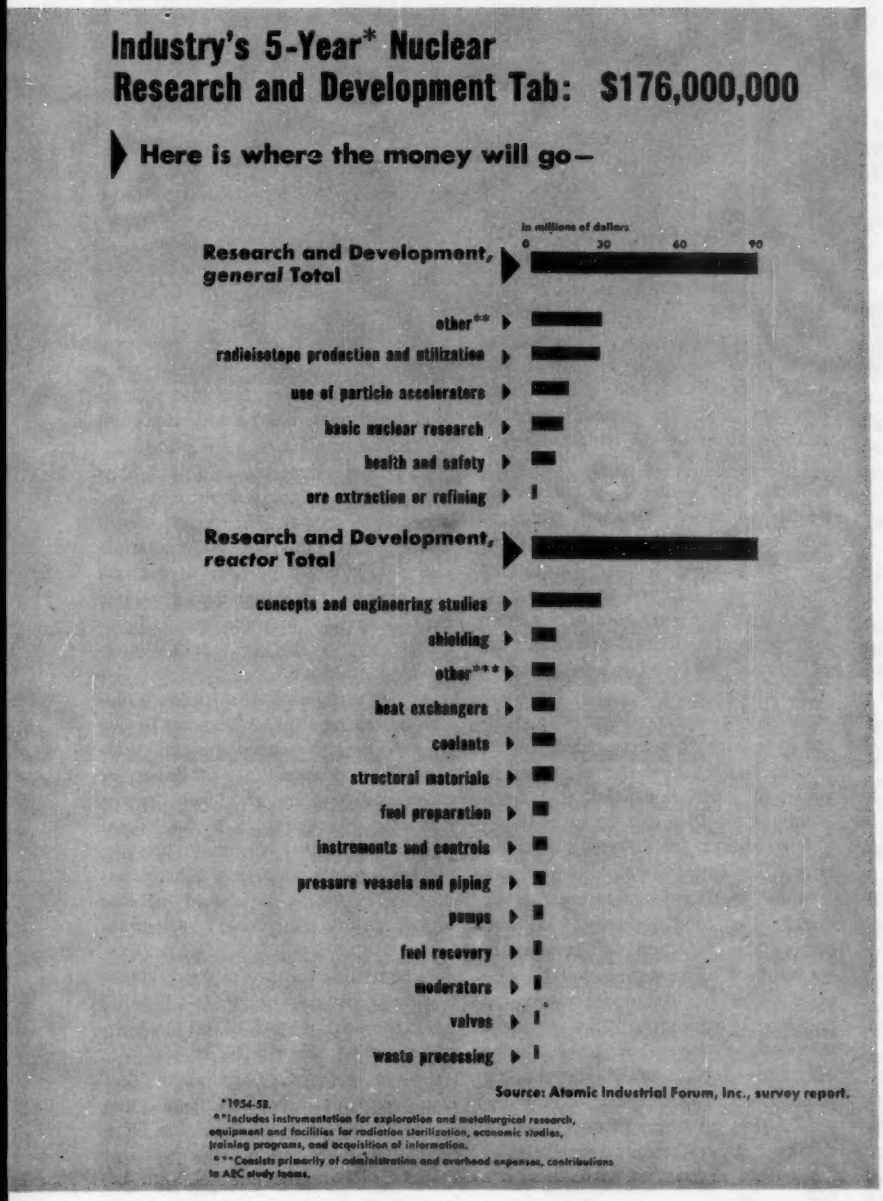
'Hot' Polymers: Further advanced commercially are irradiated finished polymers. A great deal of information on this subject has come to light as a result of AEC's own interest in plastic products as materials of construction. In order to determine how plastic parts might fare in a radiation atmosphere, AEC workers subjected almost all commercial plastics to nuclear bombardment. In almost every instance where energy was of a high order, severe degradation occurred.

Phenolic molded parts, vinyl chloride acetate copolymers, cellulose nitrate, methyl methacrylate, and even the fluorinated compounds degrade rapidly in a high-level radiation atmosphere. Chlorine-containing polymers, such as polyvinyl chloride, lose hydrogen chloride.

The fluorocarbons, which contain no hydrogen, degrade by chain cleavage, with the liberation of fluorine and deterioration of the product.

Polymeric materials possessing a branched structure such as methyl methacrylate, polyisobutylene, and α-methyl styrene degrade rapidly, generate gas to yield a foamed product.

Elastomeric materials lose their rubbery characteristics when subjected to radiation—natural rubber becomes hard and brittle by cross-linking. Polystyrene and those polymers rich in carbon and low in hydrogen appear more stable.



C W Report

Fiber polymers, too, such as nylon, Dacron, and cellulose acetate all degrade in a radiation field. If it were possible to effect reaction between fibers in the oriented crystalline state, entirely new properties might be forthcoming —i.e., wool-like characteristics arising from the oriented cross-linked arrangement.

On the other hand, in certain applications, polymer radiation has beneficial effects. The most significant example of this at present is the cross-linking of polyethylene by high-energy radiation. Short-term exposure of polyethylene yields a product that has a higher melting point and is more clear and less hazy than conventional polyethylene. This product is being offered in limited quantities by General Electric under the name Irrathene. Its advantages over the relatively high-melting low-pressure polyethylenes remain to be seen. Recent price quotation for Irrathene was $2/lb., compared with 56¢/lb. for conventional polyethylene sheet.

Another use of radiation in the polymer field is in the work of Goodyear and others with rubber vulcanization. They have shown that rubber can readily be vulcanized by radiation; but commercial utilization does not look promising, except for very thick sections that are difficult to heat through to the interior.

Probing the Flaw: The reason polyethylene insolubilizes, whereas vinyl materials degrade, some scientists believe, can be attributed to a flaw in its structure. This flaw, which may be unsaturation or a branching of the chain, acts as a focal point for further reaction, and may be the key to reactivity.

If, for example, such an irradiated, presensitized polymer is subsequently treated with a monomer, polymerization will occur at the sensitized areas. Result: a graft polymer. Such a technique may open entirely new areas of plastic materials, which could not be made by conventional methods. Although this field is known to be under active exploration, no commercially significant results have been announced.

Many materials other than polyethylene, of course, are also being studied with the hope of obtaining beneficial modifications by atomic radiation. Investigations are under way on catalysts, semiconductors, protective coatings (to improve bonding of the coatings to the metal), textiles (to improve dyeing characteristics) and various other essentially finished products.

In the case of catalysts, for example, two types of radiation effects may be visualized. One comprises controlled atomic dislocations in the crystal lattice and/or introduction of "impurities" (i.e., by transmutation of some of the parent catalyst atoms), so that the activity or selectivity of the catalyst is modified. The other general effect involves making the catalyst radioactive (by neutron irradiation).

In this case, the radiation emitted in the catalyst would be available to reactions taking place on or near its surface. The localized extra energy thus made available *in situ* might make it possible to catalyze reactions that are otherwise impossible or inefficient at moderate temperatures.

Corpuscular radiation, especially particles and neutrons, would be expected to have a greater effect on solid catalysts than gamma radiation.

There is now a strong research trend that may be summed up as follows: "Let's give it a good dose of radiation and see what happens." Thus hundreds of articles are being irradiated, often with discouraging results. Here, as elsewhere in research, there is no shortcut to success. What is needed is basic studies to determine the effects of irradiation, both beneficial and detrimental. Only then can the most favorable conditions for obtaining desirable effects be systematically determined.

'Cold' Sterilization: During the last decade the food industry has been hoping that radiation will revolutionize the field of food preservation. The observation that living organisms can be killed by radiation with a resultant temperature rise in the substrate of only a few degrees has suggested many possibilities in this field. It's now apparent that all types of food can be sterilized by radiation, regardless of the species or number of contaminating organisms.

But, despite early optimistic reports, no one is known to be marketing irradiated food.

The big problem in "cold" sterilization of foods is the occurrence of undesirable side reactions initiated by the radiation. These reactions result in off-flavors, off-odors and other deleterious properties. Three potential methods of controlling these side reactions appear promising: freezing, use of an inert atmosphere devoid of oxygen, and addition of free radical acceptors.

Irradiation of vacuum-packaged luncheon meats—e.g., with soft X rays —has given much better mould and bacteria control than that resulting from vacuum packing alone—and without the usual off-flavor development.

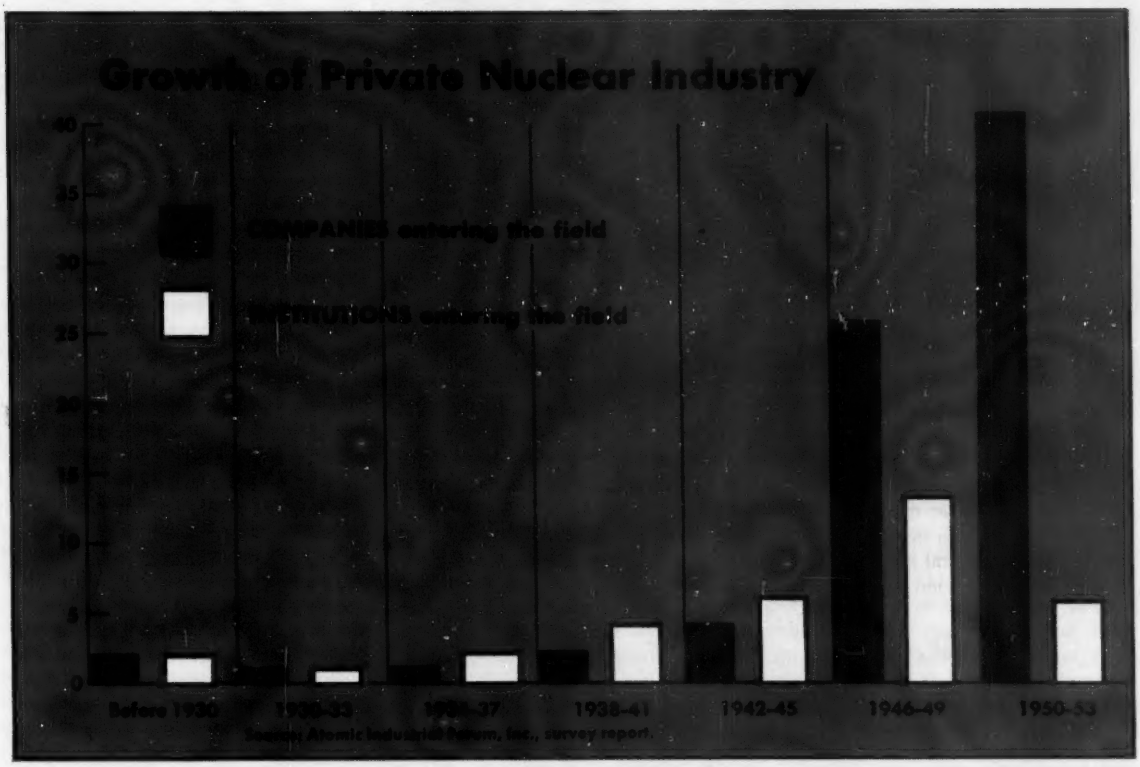
Also promising is the finding that little or no loss of essential nutrients occurs in some radiation-sterilized foods; and, to date, there has been no evidence of a toxic product having resulted from irradiation of foods. The cost of "cold" sterilizing foods would undoubtedly be somewhat higher than that of conventional methods. Some authorities, however, feel that production costs may not be too important if a better product is in the offing.

A strong possibility in this field is that "cold" pasteurization may find acceptance sooner than "cold" sterilization. Low dosages of radiation, which reduce the number of bacteria (i.e., pasteurize) rather than eliminate them entirely, produce marked increases in the storage life of the irradiated product.

Under refrigeration, so-called radiation-pasteurized meats keep up to five times as long as untreated meats. With the lower dosages, no off-flavor or color changes are produced in the product. Refrigerated bacon, hamburger, ham, fish, beefsteak, sausage, luncheon meats, and many other products show this 5- to 10-fold increase in storage life after "cold" pasteurization.

Cost of this short-term preservation treatment might be 0.16-0.30¢/lb., while the cost of sterilization has been calculated at about 3-7¢/lb.

Lower dosages of radiation have also been found effective in inhibiting the sprouting of potatoes. Aside from having a good appearance without sprouts at the end of 8-18 months, irradiated potatoes show a lower



weight loss during storage than do nonirradiated potatoes. And the taste of potatoes is not changed by the quantity of ionizing radiation used.

It has been estimated that potatoes could be effectively exposed to gamma radiation at a cost of about $3.75/ton, including all operating and capital expenses and a 10-year period of amortization. These costs are based on an approximately $50,000 unit, which could handle 20 tons of potatoes per hour. This application may well be the first to be commercialized.

Drugs, Too: Sterilization of pharmaceuticals, bandages, sutures, and other small surgical products by radiation is well into the pilot-plant stage. In fact, the first small-scale commercial use (to sterilize Aureomycin hydrocortisone ointment) was recently announced by Upjohn.

Research has shown that many pharmaceutical preparations, such as antibiotics and vaccines, can withstand radiation treatment without changes in chemical composition or biological potency. And since some of these materials are sensitive to heat, radiation sterilization appears to be a method of choice.

Radiation - sterilized polyethylene tubing for medical purposes is already on the market. Early work on the sterilization of sheep intestines for sausage casings has led to radiation-sterilized arterial segments for human transplants. The treatment of blood plasma with ionizing rays to kill the virus causing hepatitis has received some attention; and results seem promising. The sterilization of bone and corneal transplants are other uses.

Research also has been carried out on the sterilization of leather, textiles and plastics. Preliminary results indicate that a pair of shoes can be sterilized with dosages of 2-3 million roentgen equivalent physical, without detrimental effects.

Radiation is more expensive now than more conventional means of sterilization, but it might still be used to economic advantage on relatively high-cost items such as drugs. It is estimated that the first irradiated food products will probably not appear in the stores before 1960. And the use of radiation on other materials will depend on its ability to produce a better product or achieve an end that is unattainable by other methods.

As research progresses, great strides will undoubtedly be made in the development of cheaper radiation sources and wider horizons for application. Costs are again clouded by the uncertainty of future atomic power developments, which will control the availability and cost of fission products.

Radiation Sources

Right now, the major problem is finding enough radiation sources to supply the growing industrial demand. Until fairly recently, privately owned units were practically nonexistent; but they are now rapidly on the increase. At present, three kinds of sources are available: radioisotopes, nuclear reactors, and machine generators.

Isotopes on Top: Radioisotopes are probably the most widely used of all radiation sources available to the process industries. Over 5,000 different groups across the U.S. are now using these activated atoms for everything from tracing fertilizers in plants to finding out the whys and wherefores of corrosion.

Cobalt-60, produced by irradiating

C W Report

cobalt metal with thermal neutrons, is the most commonly used neutron-activated isotope. The rest of the radioisotope sources are divided into those produced by neutron activation, like cobalt-60, and those derived from the fission process.

The fission isotopes can best be classified as follows: spent-fuel elements that have had no purification; mixed fission products that have been separated from the fuel and structural material but not from each other; and individual products, such as cesium-137, that are substantially pure. Production costs, of course, increase with increasing purity, but the advantages obtained by purification (e.g., known decay rate and constant photon energy) are often worth the additional cost.

Of the individual fission products, cesium-137 is perhaps the most significant for the long term. With a half-life of 33 years, it requires less frequent replacement than do the other sources discussed above. Gamma rays from this source do not have the penetration of those from cobalt-60, but their penetration is adequate for most purposes. Cesium-137 is not now available in large quantities. Oak Ridge National Laboratory, however, is planning a pilot plant that will have a capacity of 200,000 curies/year.

Only one mixed fission product source is in current use for research* —a 1,000 curie source prepared by the Argonne National Laboratory for Massachusetts Institute of Technology. It consists of radioactive wastes embodied in concrete and installed in a shielded container.

Spent-fuel elements from the Materials Testing Reactor are being used as radiation sources while they are "cooling," a step that such elements must undergo before reprocessing. Two facilities under construction at Argonne National Laboratory and at Dugway Proving Grounds (Idaho) will likely provide additional spent-fuel radiation sources.

*Sinclair Research Laboratories, Inc., research subsidiary of Sinclair Oil Corp. recently revealed plans for a radiation facility using fission products from the Materials Testing Reactor.

If solid fuel elements are used extensively in reactors of the future, it is quite possible that plants will be built to utilize the radiation that such elements emit as they "cool" before reprocessing. Preferably, of course, such radiation facilities would be located close to the reactor from which the elements are taken.

Hothouses: These facilities may be either the cave room or the pool type. The former is more expensive to construct, requires costly remote-handling-viewing facilities; but the absence of shielding water and the opportunity of having any desired atmosphere are definite advantages.

The pool type is relatively inexpensive to construct and the water provides a transparent radiation shield in which manipulations are possible with simple hand tools. The advantages of the pool type could easily justify the use of special containers to exclude water or provide desired atmospheres over the specimens being irradiated.

The costs per curie of cobalt-60 and cesium-137 are now about equal. The cost of mixed fission products is not yet established and even an esti-

RADIATION SOURCES OF IRRADIATIONS SERVICE AND CONTRACT RESEARCH

Location	Radioisotopic	Machine
Argonne National Laboratory	Spent fuel elements	Van de Graaff
Oak Ridge National Laboratory	Cobalt-60	
Brookhaven National Laboratory	Cobalt-60; tantalum-182	Van de Graaff
National Reactor Testing Station	Spent fuel elements	
Stanford Research Institute	Cobalt-60	Van de Graaff
Massachusetts Institute of Technology	Cobalt-60; mixed-fission products	Van de Graaff
University of Notre Dame		Van de Graaff
High-Voltage Engineering Corp.		Van de Graaff
Battelle Memorial Institute	Cobalt-60	High-output soft X ray
University of Michigan	Cobalt-60	
General Electric Corp.		Resonant transformer
Bradley Container Corp.		Van de Graaff
Yale University	Cobalt-60	

mate of charges for radiation from spent-fuel elements is not likely to be meaningful. There is little doubt that the cost of all of these sources will decrease and that the cost relationship among them will come to reflect their relative usefulness.

Reactors for Intensity: Unlike radioisotopes, which emit only gamma rays, reactors provide a mixture of fast thermal neutrons and gamma radiation. The radiation intensity is a function of the power level and reactor design; but, in general, higher intensities are achievable with reactors than with radioisotopes.

Mixed radiation of reactors has been used to study radiation effects, particularly damage, on a wide variety of materials. It has been found that the more drastic effects of fast neutrons and radioactivity induced by thermal neutrons are often undesirable in potential industrial uses of radiation. In these cases, other sources must be used or (in the case of reactors) provision made to screen out neutrons and provide only a high-intensity gamma field.

With the exception of one at North Carolina State College, operative reactors in the U.S. are government owned. But many new reactors are planned or under construction, and these will be operated mostly by universities, research organizations, and private industry. Costs vary from $500,000 to $15 million, depending on type, power output, and auxiliary facilities. For all but very high flux densities, the pool-type research reactor seems to offer the most flexibility and safety at moderate cost ($250,000 to $1 million).

A nuclear reactor in a processing plant would now be subject to many regulations and restrictions designed to safeguard employees and neighbors. But as more experience is gained in operating reactors for research and power production, the regulations governing a plant reactor should grow less restrictive. Only then can a significant economic comparison be drawn between reactors and other sources of radiation for use in plant operations.

Plenty of Machines: Radiation machines such as Van de Graaff accelerators, linear accelerators, capacitrons, resonant transformers, and X-ray machines are already in use as radiation sources in both research and production applications. Although

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some of these machines serve as sources of positive ions and neutrons, they are used primarily to produce high-energy electrons and X rays.*

Compared with radiation sources such as cobalt-60, these machine generators are definitely handicapped by limited penetration of the radiation they produce. At the same time, many of these units will probably be chosen for those applications in which power is more important than deep penetration (e.g., in most syntheses and sterilization uses).

Among the most prominent radiation-generating machines are:

- Soft X-ray unit, which promises to offer most of the desirable features of machine electron sources but at substantially lower cost. High-power machines of this type are not available commercially. But a commercial prototype soft X-ray unit, which operates at 60 KVP and 200 milliamperes, is in use at Battelle. This unit does not require a special irradiation room and its cost is about 10% of the cost of a shielded irradiation room and machine electron source capable of delivering the same power. The effective penetration of 60 KVP X rays is comparable to that of 1 mev. electrons.
- Van de Graaff accelerator is one of the oldest sources of high-energy electrons. Although the upper limit of electron energy has not been established, the practical limit consistent with reasonable equipment costs is probably several million electron volts. Power outputs of these machines may range as high as 12 kw.
- Linear accelerator can be constructed to deliver higher energy electrons than the Van de Graaff (for comparable equipment cost), but the power output is significantly lower.
- Capacitron has been a valuable source of electrons for years. A ca-

*Although the effects of electrons, beta particles, X rays, and gamma rays are essentially the same, the radiations differ greatly in their penetration. Of limited penetration, electrons and beta particles are generally restricted to use on material in thin layers or surface treatments while X rays or gamma rays may be used on much thicker materials.

pacitron capable of producing an electron beam of up to 2 mev. in short bursts (microsecond) is under development.

• Resonant transformer is the newest machine source. Current models are probably 1 to 2 mev., but said to be capable of elevation to 10 mev. Power outputs to 5 kw. are attainable. Most resonant transformers were originally available on a lease basis, but for the past few months they have been offered for outright sale. Costs are roughly comparable to those of the Van de Graaff at the same power and energy levels.

When greater penetration is desired, electron-generating machines can be converted to X-ray production by impinging the electron beam on a target material such as gold. A great sacrifice in power output is needed to achieve this greater penetration because of the low conversion efficiency of electrons to X rays.

All units of course, require special shielding to protect personnel from radiation. The amount and cost of shielding increases with increasing energy. Equipment and special housing for a machine source with a high power output require a substantial additional investment.

Nothing Definite: Some of this information, particularly that pertaining to costs and availability, will doubtless be revised in the future. Continuing developmental work on machine sources should result in more versatile units and, together with expanded usage, should lead to decreased costs. Spent-fuel elements obtained as a by-product of the operation of research and power reactors should substantially decrease costs and increase availability of separated and mixed-fission-product radiation sources. In addition, neutron-activated radioisotope sources such as cobalt-60 may be produced in quantity at a low cost as a secondary application of these reactors. It was recently predicted, for example, that megacurie cobalt-60 sources would soon be available from Savannah River, and that the cost could be expected to drop from the present $4/-curie to perhaps 15¢/curie.

Ahead

Nuclear energy has not yet had its full impact on the chemical industry; in fact only a start has been made. Just how big an impact this will be is

CW Report

impossible to say with any degree of certainty.

The as-yet-unanswered question of economics, of course, still looms very large in any such discussion. But the experts are guessing big.

Some clues to the future can be garnered from the few commercial uses (discounting power generation for the moment) found to date, namely, beta-ray thickness gauges for process control, the cross linking of polyethylene and sterilization of drugs.

In these applications, radiation does a job that cannot be done as well by any known means. Thus, while no announcement has been made of a commercial process to produce chemicals using atomic radiation, one would predict that first success will come with reactions that normally cannot be run or that are run with difficulty by conventional procedures. Costs in this case would probably be a secondary factor.

These facts strongly suggest the research rather than the development approach to this field: the search must be for the unusual. The belief that such possibilities do exist is clearly demonstrated by the large investments in equipment already made by a number of chemical companies. These outlays may be looked upon as insurance that these particular companies will have the experience, know-how and patent position to capitalize quickly on bright developments that are now in the offing.

REPRINTS AVAILABLE

Copies of this report are available from Chemical Week, Reprint Dept., 330 W. 42nd St., New York 36, N. Y., at 50¢ each.

Prices for bulk quantities (over 10 copies) and for previous CW Reports are available upon request.

Corrosioneering News

Quick facts about the services and equipment Pfaudler offers to help you reduce corrosion and processing cost.

Published by The Pfaudler Co., Rochester, N.Y.

What Progress Against Corrosion in 1955?

A top-level report by DONALD A. GAUDION

Executive Vice-President, The Pfaudler Co.

How big a problem is corrosion?

Some sources tell me it costs industry about six billion dollars a year. In petroleum alone, every barrel of crude oil processed eats up 9¢ worth of equipment.

And with today's trends toward higher pressures, higher temperatures, continuous processes, you can expect corrosion to step up its attack on your equipment.

At Pfaudler, we traffic in corrosion-resistant equipment. Our specialty is a material called "glassed steel"—acid-alkali-resistant glass, permanently fused to steel, to give you the corrosion resistance of glass plus the structural strength of steel.

At the same time we have developed a broad knowledge of corrosion-resistant alloys, like Hastelloy, Inconel, Monel; the stainless steels; aluminum; copper; titanium; and synthetics, such as Teflon and Kel-F.

Guarantee against corrosion

Several innovations appeared, to help you lick corrosion. A hitherto unheard of guarantee was given: No corrosive destruction for 12 months on Pfaudler glassed steel equipment!

We also introduced a new glassed steel dryer-blender . . . Bigger reactors in money-saving *standard* designs . . . New nonmetallic seals for agitators on reaction kettles . . . New glass Turbogrid column trays . . . and other new or improved units.

While our research crew probed the future, we also added greatly to our knowledge of corrosioneering by examining reports from users of Pfaudler equipment over the past year. For example, we learned that, in 28 installations, our "packaged" system for plating acid recovery usually paid for itself in 6 to 12 months.

More engineering services

To further help you with corrosion problems, we revamped our technical staff, adding a new Applications Engineering Group. You can add their experience to yours whenever you are faced with special projects. They can "take over" if you want them to.

Corrosion Seminars

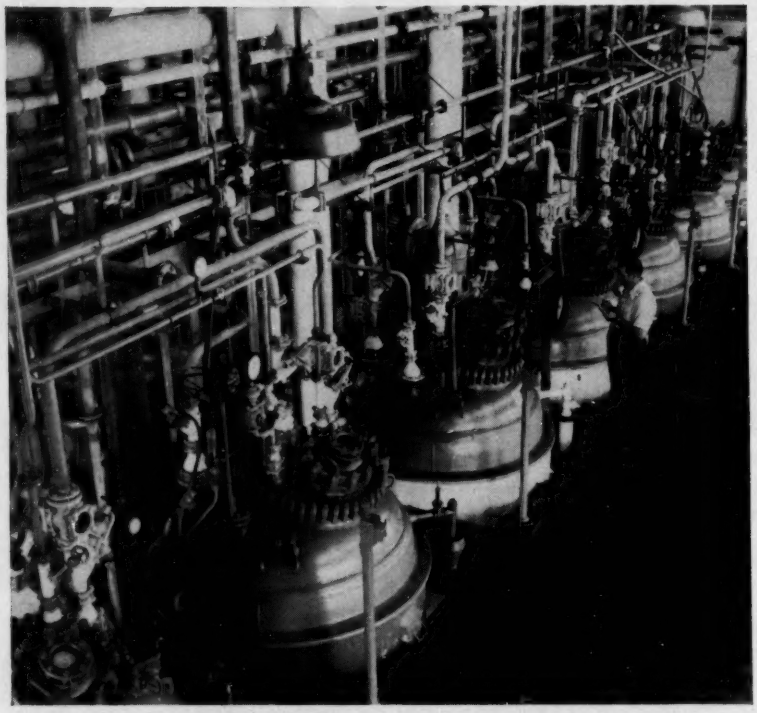
To increase general knowledge of new developments, we conducted four Corrosion Seminars during the year. Also, technical talks and articles were delivered by Pfaudler people. In research, we have continued our scholarships at Ohio State, Rochester, and Penn State Universities, Rochester Institute of Technology and Rensselaer Polytechnic Institute.

To you, who must pay the bill for corrosion, we believe these progressive steps are significant and worthy of your investigation. Meantime, we are searching daily for new approaches, and will report frequently to you on the pages of this publication.

New glassed steel Turbogrid column, inspected by Mr. Gaudion, is one of many new corrosion-resistant developments. (Details on page 3 of this insert.)

FOR HIGHLIGHTS of new corrosion-resistant equipment, turn the page.

1955 saw introduction of this new



Project engineering services grease wheels of expansion

In 1955, Pfaudler extended its project engineering services to the point where many companies were expanding into entire new plants without adding to the burden on their own organization.

An excellent example is the $400,000 project shown above. This chemical plant was delivered in its entirety to a South American processor by Pfaudler, who assumed complete responsibility for yield specified.

The purchaser needed only one letter of credit – to Pfaudler – and had one central source of information on delivery dates, specifications, etc. In turn, Pfaudler was able to select economical standard equipment wherever possible. While much Pfaudler-built equipment was used, 78 different orders for equipment were placed with other manufacturers.

Pfaudler project engineering is a flexible service which takes over as little or as much of your equipment buying as you choose. It consists of six steps, performed by a well-qualified engineering group at Pfaudler: 1. Project engineering (specifying equipment). 2. Selection of materials. 3. Corrosioneering. 4. Equipment design. 5. Fabrication and delivery. 6. Start up and instruction of your personnel.

Complete new choice of *interchangeable* seals and stuffing boxes

You can now change over from stuffing box to mechanical seal on a Pfaudler reaction kettle, right in your own plant. Agitator ends have been modified to make this reassembly possible. Thus, you have complete flexibility to choose the type of seal you want, and to change at any time at minimum expense.

Along with this innovation in flexibility, Pfaudler also introduced its sensational new *nonmetallic* seal. If your reaction has any of the following requirements, you may find this new seal to be the perfect solution:

1. Freedom from lubricant contamination.
2. No vapor loss.
3. No metal or packing materials to contact your product.
4. Pressures from 150 to 1500 psi.
5. Agitator speeds above 150 RPM.
6. Temperatures above 350° F.

Add titanium to Pfaudler family

While glassed steel merrily rolls on as the most versatile anti-corrosion material, Pfaudler research and engineering has also accumulated experience with all the likely candidates among the alloys and metals.

One result of this program: introduction of our titanium reactors.

Titanium is becoming popular for its light weight, physical strength, and resistance to corrosion at high temperatures. Jet planes and atomic energy have put these properties to use.

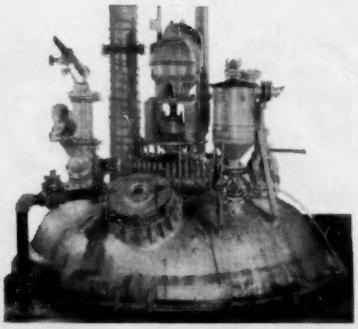
Now Pfaudler is ready to help you apply the same advantages to chemical processing.

3,000 to 4,000-gal. glassed reactors now offered in low-cost *standard* designs

Smashing the size barrier, The Pfaudler Co. now fabricates glassed steel reaction kettles in the 3,000- to 4,000-gallon range – as *standard* models.

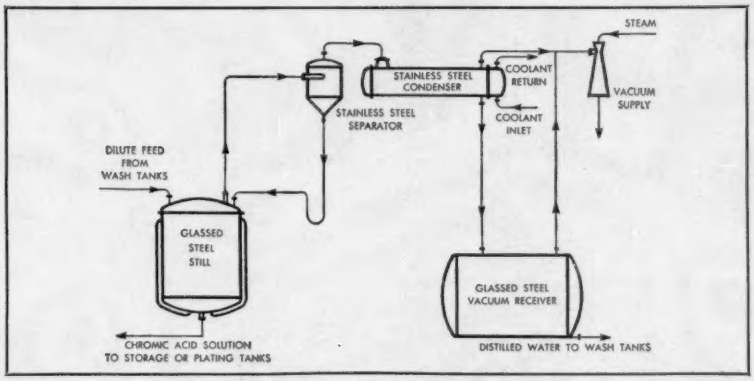
This use of standard designs saves you money because it eliminates special engineering. And it saves time because it uses stock parts and standard accessories.

Of course, where your requirements are of a special nature, special refinements are available, as well as entirely custom-engineered reactors up to 8,300 gallons.



This glassed steel reactor at Schenectady Varnish Co. incorporates these new standard features. Note its compact drive support, leaving ample head space for other equipment. Left of drive is a glassed steel column, 18″ dia., for calcium chloride; right foreground is 14″ glassed steel hopper for adding catalyst.

Pfaudler equipment to combat corrosion

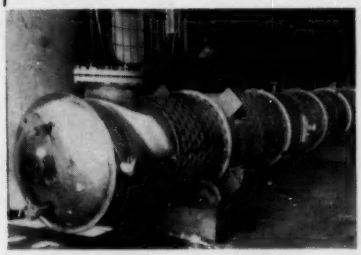


Packaged recovery systems pay off in 6 months

Here is one of the four systems Pfaudler has introduced to recover acid plating salts. In actual installations, the equipment often pays for itself in six months to a year, by saving acids which would otherwise have been wasted. This process also helps its user meet any legal restrictions on waste disposal.

The system re-concentrates the solution, providing a new solution for the plating process, using "waste" acids. The four systems offered by Pfaudler are: a batch system, a semi-continuous system, and two fully continuous automatic systems. Capacities range from 50 to 2,050 gallons per 8-hour day.

Two new developments in columns: "dimples"... and a big boost in capacity



Stainless steel column with reinforcing dimples.

Glassed column with new high capacity.

Unique reinforcements add to strength, not cost, of columns

The dimpled stainless steel jacket, which Pfaudler developed to build high-pressure reaction kettles without expensive and heavy construction, has been applied to the fabrication of columns.

It lowers the cost, increases strength, and lowers weight of your columns. Code stamping provided.

The dimples are a series of close, reinforced indentations, about 2″ in diameter, covering the entire surface of the column. These pockets absorb pressures far beyond the ordinary strength of the stainless steel.

Send coupon (page 4 of this insert) for further details.

New Turbogrid trays give up to 100% more capacity

Today it's possible to have a column that doubles your present capacity, resists corrosion at elevated temperatures, adapts from one process to another, and remains easy to clean.

The new Pfaudler glass tray design provides up to 100% greater capacity than most bubble trays, about the same separation efficiency per foot of tower height, and as much as 80% less pressure drop per tray.

New Pfaudler Turbogrid trays are available in new columns, or you can have them installed in any existing column with at least 18″ diameter. If you would like more information, just check the last page of this insert and mail.

A WRITTEN GUARANTEE AGAINST CORROSION!

One of the biggest news stories of 1955 was the announcement that you can now purchase chemical equipment that is actually guaranteed against *corrosion!*

This differs radically from the usual guarantee that has been offered for years by Pfaudler and other fabricators.

For the first 12 months after its delivery, your glassed steel equipment is guaranteed *not* to become unserviceable as a result of corrosion or it will be repaired or replaced "on the house." This guarantee applies, of course, only to the operating conditions agreed upon at time of purchase.

Already, sufficient data is available for providing this guarantee on equipment for processing nitric, sulfuric, phosphoric, hydrochloric and acetic acids, and other acids will be added to the list as further information becomes available. Are you taking advantage of this proposition?

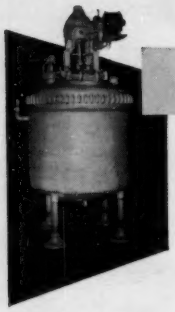
DOCUMENTARY EVIDENCE of the corrosion resistance of glassed steel to certain acid solutions is presented by charts and data in our new Bulletin 928. To get your copy, write or mail request slip on next page.

Faster drying, blending with new glassed steel mixer-tumbler

In 7 hours, a large manufacturer now dries as much of his product as formerly took 4 days!

Faster drying is one of many advantages of the Pfaudler glassed steel conical dryer-blender. It dries quickly because its tumbling rotation exposes the contents to a vast drying area. It blends quickly – because of the same thorough tumbling action. It cleans easily – because its glassed steel walls resist sticking (this also improves heat transfer). It resists corrosion – because it's lined with Pfaudler acid-alkali-resistant glass.

Pfaudler blenders available in working capacities of 2.4, 19, 66, and 153 cu. ft.



TECHNICAL TALKS

On the care and feeding of

PLASTICIZERS • SYNTHETIC RESINS • SYNTHETIC RUBBER

by J. M. CULOTTA, Project Engineer

In processing plastic materials, many problems of purity and heat control have been solved with glassed steel equipment.

For example, take a typical process – the polymerization of vinyl chloride.

Transformation of the vinyl chloride monomer to a pure and uniform resin requires a careful balance of ingredients, catalyst and additives, and close control of the agitation intensity, temperature, and other process variables.

To achieve controlled polymerization, the vinyl chloride is emulsified or held in suspension in water. Care must be taken in selecting the material of construction for equipment in which the raw materials (monomer, water and additives) are stored, handled and reacted. The slightest amount of contamination by iron or other metals would have a detrimental effect on product quality. Highly corrosive hydrochloric acid is formed when vinyl chloride decomposes in the presence of water. Glassed steel is uniquely resistant to attack by this acid.

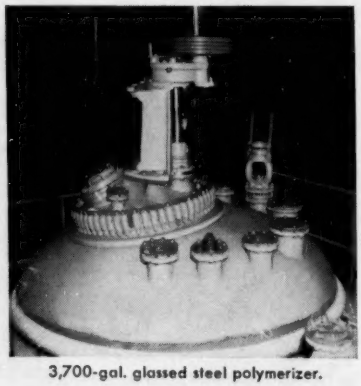
UNIFORMITY:

Another important consideration is the uniformity of the resin in respect to particle size and molecular weight. Particle size uniformity is controlled by the concentration of surface active agents and by proper agitation. The intensity of agitation throughout the polymerization vessel should be uniform; otherwise, localized areas of high turbulence would tend to produce fines, while "dead spots" would result in lumps and clumping. The glassed steel impeller and baffle arrangement designed for polymerizers produces a smooth, uniform agitation intensity throughout the entire vessel.

The temperature in vinyl chloride polymerizations usually must be controlled to within plus or minus 1° F. Since the glassed steel surface of the polymerization kettle can be quickly cleaned after each run, build-up of product film within the vessel is virtually eliminated. This permits a uniform rate of heat transfer across the walls of the polymerization vessel from run to run, eliminating hot spots, and insuring uniform temperature control.

SOLUTION:

Three basic requirements for the processing of plasticizers—good color, low volatility, and absence of odor – are met with glassed steel equipment. While resins are processed at relatively low temperatures (100°-150° F.), plasticizers are prepared at temperatures to 350° F. Acid concentrations are higher and corrosion severe. Glassed steel is impervious to the corrosive environment of the esterfication and condensation reactions. The absence of metal prevents the development of color due to metallic corrosion and prevents unwanted side reactions by catalytic action. The ease with which glassed steel may be cleaned is particularly desirable when different plasticizers are manufactured in the same equipment.



3,700-gal. glassed steel polymerizer.

Printed in U.S.A.

Again Time to Change the Subject?

CONSUMERS in eight markets are this week seeing the beginning of what will probably shape up as the biggest detergent advertising free-for-all of 1956, possibly the biggest since synthetics shifted into high gear in 1947.

They are living in the areas where the new liquid heavy-duty detergents are being introduced—Lever Brothers' Wisk (*CW Business Newsletter, Feb. 4*) and Armour's Gee (*CW, Nov. 19, '55, p. 127*).*

Wisk is making a distinct break with past detergent advertising trends. Whereas the tendency has been to stress specialized uses (e.g., for automatic washing machines only), Wisk is calling itself an "all purpose" cleaner, good for family wash, delicate nylons, dishes, kitchen cabinets, bathtubs, greasy stoves, rust-stained screen doors and any number of cleaning uses.

Madison Ave. Technology: Coming up with this type of product puts Lever a step ahead in the constant race to supply the Madison Ave. agency copywriters with new talking points as fast as they are supplied with new money.

You get an idea of the speed of this race when you consider that Procter & Gamble is the nation's biggest advertising spender—even bigger than General Motors, although the entire soap industry's gross last year didn't equal GM's $1-billion profit. (According to Assn. of American Soap and Glycerine Producers estimates, the industry grossed $861 million in '55—an 8.5% sales increase over '54. Synthetics were up 12.3%, soap was down 6.4%, liquid synthetics were up 28.7%.)

Technological progress and advertising progress usually go separate ways. A new ad campaign, for example, might be based on a relatively old—albeit unpublicized—product feature. (Example: Tide's "no rinse" promotion, which followed by some months—without a product change—the introduction of the detergent.)

On the other hand, an average of two product improvements are made each year (P&G generalizes) without necessarily showing up in the ads. Generally, selling points are used up one at a time, and an approach isn't discarded as long as it is selling soap.

As the ads (*right*) indicate, however, Wisk isn't the first instance of a real product change immediately showing up in promotion. Others were introduction of synthetic Tide (1947), Rinso with optical bleach (1947), low-suds All (1952) tinted Cheer (1952), and Oxydol with perborate bleach (1955).

Dispenser Makes a Difference: Taking advantage of the promotion opportunities in Wisk's handiness ("no bulky or soggy boxes") and versatility, Lever is planning the biggest advertising budget in its history.

By fast groundwork and sustained effort, Lever hopes to put Wisk into the same unshakable position as Tide achieved in dry synthetics. Spurring Lever is the very real possibility that the liquids might become the standard wash-day product. Significant: by '57, several makes of automatic washers will have built-in detergent dispensers—which will take only liquids.

Don't be suprised to see a campaign this year or next (by an improved liquid, or a back-talking dry) stressing the word "cleaner" instead of the now-popular "brighter, whiter." Tests show that liquids don't yet do as thorough a cleaning job as the granulars, but keep up appearances with an extra dose of optical bleach.

The pioneer heavy-duty liquid—Armour's Gee—is moving more cautiously than Wisk. A low-sudser, Gee is not called "all purpose," is promoted strictly for automatic clothes washing. Part of Armour's caution stems from a can-corrosion problem, now licked. (Withdrawal of this old stock for replacement was behind unfounded rumors that Gee was being dropped.) Another Gee problem was poor consumer response to its initial "doesn't need hot water" advertising, now abandoned.

Cool Water: The liquids, because of easier solubility, perform much better in cool or warm water than the drys. But Armour found that the public just didn't believe it.

This lack of credibility is one of the reasons why the often-speculated-about cold-water detergent has not yet been delivered to the ad men. The

*Armour's Gee is in Jackson, Miss.; Montgomery, Ala.; Springfield, Ill.; Terre Haute, Ind.; Lever Brothers' Wisk is in Cleveland, St. Louis, Indianapolis and Grand Rapids.

other reason is the lack of an effective product.

Although some soapers insist that it would be no trick to make, and that the lack of a market is the only thing holding them back, others contend that it's not as easy as all that. They say that, so far, nobody has come up with a detergent that works satisfactorily in ordinary tap water temperatures (which range, in the U.S., between 70 and 45 F). Furthermore, they say, good cold-water action is incompatible with good hot-water action.

This seems to be borne out by the fact that U.S. detergents, like P&G's Tide and Colgate's Fab, have different formulas when tabbed for export to cold-water markets such as in Mexico.

Right now, the Big Three thinks that none of the cold-water markets are worth an ad budget. They say:

- People without water heaters constitute an unprofitable low-income market.
- Present detergents are adequate for luke warm washing of thermoplastic synthetic fabrics (Du Pont, for one, agrees).
- Money spent on re-educating consumers could be more profitably spent elsewhere.

Others, who think a pile of money awaits him who comes out with the first good cold-water detergent, point to the success Monsanto and others have had in reversing another consumer conception: that lots of suds are needed.

Any potential promotion for a cold-water product will likely put a lot of weight on improved detergent-sanitizers. The impression that hot water kills germs (actually, at usual washing temperatures it has little such effect) is the biggest part of consumer resistance to a cold-water wash. Fear of Federal Trade Commission interference has, so far, kept sanitizer talk out of soap advertising.

The cold-water detergent question is another that might be solved by the washing machine makers. Bendix already has a water heater in its machine; Maytag, on the other hand, is pushing research on a cold-water detergent, has a cold-water cycle in its automatic.

In the Fight: Whatever happens, it's a safe bet that today's popular brands will still be around—and active. Intracompany rivalry will continue and the old granulars will probably fight the new liquids. The philosophy is that advertising money works most efficiently if spread among several brands —even within the same company.

Some indications of what they will talk about are already here. Oxydol, with its perborate bleach, will probably lead a parade of other detergents equipped with the same advertising gimmick. Others will probably counter liquid "all purpose" claims, with more specialization (such as P&G's Cascade —for automatic dishwashers). And, against the coming automatic liquid dispensers, the powders are pushing a development of their own—a water-soluble bag of detergent that can be tossed into the washer and forgotten.

In Britain: Press, Posters, Premiums

SYNTHETIC DETERGENT promotion in the United Kingdom has moved into a new and more competitive phase during the past 12 months. In 1954, the products, all fairly new, were pushed mainly with giveaways and coupons (and a price war). England is compact enough to make this sort of direct approach feasible—when Unilever's (parent of U.S.'s Lever Bros.) Omo was introduced last year, it was pushed by sending a free sample to each home in the country.

But last year, England's Big Two —Unilever and the bigger Thomas Hedley (a P&G affiliate)—concentrated on press and poster advertising, spent well over $2.8 million on press space alone.

During this period, Hedley introduced Cheer to the U.K., and included a yellow duster in each box—the first time a premium has been used by a British soaper.

This gives Hedley three heavy-duty synthetics (the others: Daz, Tide) and Unilever two (Surf, Omo). And each has one light-duty synthetic: Hedley's Dreft, and Unilever's Quix (also available in liquid form). Although these two dominate the industry, smaller firms (including Colgate-Palmolive, Domestos, and the Wholesale Co-operative Society) are factors, too.

Unlike their U.S. opposite numbers, English soaps still outsell synthetics. Detergents now have 40% of the domestic market, but the percentage gain is dwindling. There are, in fact, signs that the soaps (Oxydol, Persil, Lux) may soon be holding their own.

The export situation, however, is different. Synthetics are now by far the most important category in total soap and detergent exports and are gaining fast. Synthetic exports totaled $18.7 million last year, a 70% increase over 1954, and 250% over '53.

Three for Coating

When Canadian Industries Ltd. dedicated its new research laboratory in Toronto, Canada, last week, it also took the wraps off a trio of new paints. Developed for three different industries, the coatings hint of some striking improvements in formulation.

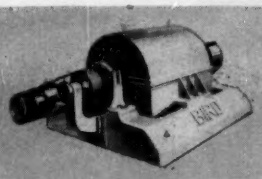
Take CIL's new automobile finish, for example. Tagged RL-100, the new paint reportedly offers high resistance to scratching and discoloration caused by overbaking. Other claims:

- Baked at above-average temperatures, the paint cuts finishing time, boosts production line capacity.
- The paint can be readily touched up at the factory production line. It's designed for auto makers, not refinishers.
- It will match conventional paints in cost on a use basis—though prices haven't been firmly established, and the paint won't be in volume production for about three months.
- Hardness of the baked coating eliminates need for waxing the finish for several months.

These properties, and the code name RL-100, smack of Du Pont's new Dulux 100 coating (*CW, Jan. 21, p. 74*). This CIL ruefully admits, but calls it coincidence.

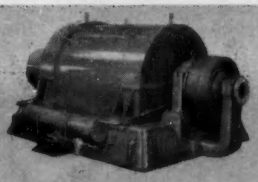
CIL says the composition of its new paint is nothing novel, except that "ingredients uncommon to baking enamels are employed." The paint will be used on Canadian in '56.

Two Parts for Appliances: Perhaps



THE BIRD SOLID BOWL CENTRIFUGAL FILTER

For continuous separation of solids from liquids by centrifugal sedimentation. Requires no cloths, no vacuum, no auxiliary equipment.

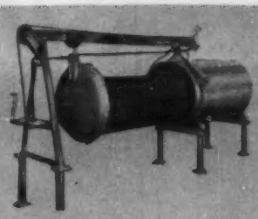


THE BIRD CENTRIFUGAL CLASSIFIER

For continuous, precise separation according to particle size of solids in liquid suspension. Effects sharp separations from 200 mesh to one micron.

THE BIRD-PRAYON VACUUM FILTER

A continuous, rotary, horizontal, tilting pan filter that provides complete solids discharge and super-efficient, multistage washing with no dilution of the mother liquor.



THE BIRD PRESSURE FILTER

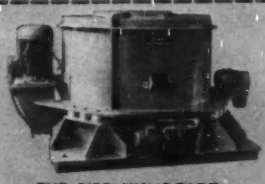
A high capacity, horizontal tank, vertical leaf filter. Opens for cleaning without disconnecting any piping.

WIDE CHOICE

Bird offers the most complete range of modern equipment for the separation of solids from liquids.

WISE CHOICE

The Bird Research and Development Center will furnish you facts and figures based on authoritative pilot-scale tests so that your selection of a filter or centrifuge is based on pre-performance proof. You can be sure your selection is the best for the project.



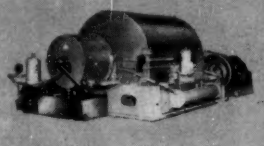
THE BIRD-HUMBOLDT CENTRIFUGAL

Combines controlled high frequency oscillation with centrifugal force for dewatering crystalline or granular solids at low cost of power and maintenance.

THE BIRD-YOUNG VACUUM FILTER

A single compartment, rotary drum filter that provides high capacity per unit area, excellent washing, sharp wash separations and complete cake discharge.

Get both from BIRD...



THE BIRD COAL FILTER

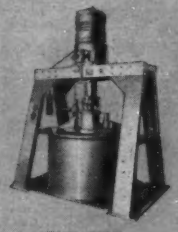
A continuous, solid bowl centrifugal filter specially designed for dewatering fine coal.

THE BIRD POLISHER

A continuous, solid bowl centrifugal filter for water clarification in preparation plants. Will handle flocced fines.

THE BIRD SCREEN CENTRIFUGAL FILTER

For continuous separation of crystalline or granular solids. Delivers a uniformly dry, well washed product. Washes may be kept separate if desired.



THE BIRD SUSPENDED CENTRIFUGE

A heavy duty, high capacity batch centrifuge.

BIRD
MACHINE COMPANY

LEADING AUTHORITY ON SOLIDS-LIQUIDS SEPARATIONS
Builders of
SOLIDS-LIQUIDS SEPARATING EQUIPMENT
SOUTH WALPOLE • MASSACHUSETTS
Regional Offices: Evanston, Illinois • Portland, Oregon

a more important development, from a technological standpoint is CA Enamel, the temporary name for CIL's latest appliance finish. It's based, reports the company, on an "entirely new resin," the vehicle being a two-stage cross-linked vinyl copolymer resin.

Sold as a two-part material—before use, the hardener is mixed in—the product is said to feature:

- High resistance to discoloration or yellowing.
- Resistance to wear and softening by soaps, detergents, greases, household chemicals.
- High gloss, resembling that of porcelain (but without the same abrasion resistance).

The paint can be baked at conventional temperatures and times. To speed production, says CIL, baking may be accelerated by higher temperatures.

Though commercial production hasn't started, volume test quantities are available.

No Rub: For do-it-yourself craftsmen, there's CIL's Velour. A varnish designed for wood, Velour is plugged for its hardness and mar resistance and low-odor qualities.

Based on alkyd resins, the new varnish contains so-called odorless solvents. It produces, without hand-rubbing, what CIL terms a satin finish. Full-scale production should be under way within two months.

Lesson in Promotion

To introduce its new acrylic latex interior paint, Nalplex, National Lead is trying an approach that should make competitors, as well as customers, take notice. The technique: inclusion of a complete color card in every copy of the Feb. 21 issue of *Look* magazine. It's tied in with a four-color advertisement and five pages listing National's dealers.

The card insert is the genuine article —paints, instead of ink, are used for the color tabs. In addition to showing the colors, the tabs show texture and flexibility of the finish.

Based on Rohm & Haas's Rhoplex AC-33 vehicle, Nalplex is touted as being odor-free, fast-drying (it dries in one or two hours), and easily applied by brush or roller. A water-thinned paint, Nalplex can also be easily removed from the brush or roller.

PATENTS

Stable Stick: Stabilized stick deodorants have been developed by Pharma-Craft Corp.'s Kedzie Teller. Composition: sodium zirconium lactate dispersed in a gel of sodium stearate-aqueous alcohol (U.S. Pat. 2,732,327).

•

Double Duty: A textile treatment that is said to halt shrinkage of both cellulosic and wool fibers has been developed by American Cyanamid (U.S. Pat. 2,730,427). A diglycidyl ether in aqueous solution produces the stabilizing effect.

•

Cleanup Plus: A new bactericidal detergent composition has been conceived by Monsanto's David Beaver, Paul Stoffel, and Roland Shumard. One of several such materials developed by Monsanto during the past few years, it features a halogenated *tris*-phenol as the bacteriostat (U.S. Pat. 2,730,502).

• Another approach to detergent-germicide manufacture is suggested by Lawrence Little and Gilmore Chen. As described in U.S. Pat. 2,727,007 (assigned to E. F. Drew & Co., New York), a quaternary ammonium germicide, an alkali metal carbonate, and an alkali metal polyphosphate are combined to produce the disinfecting cleaner.

•

Slipless Shine: Polish made with colloidal silica has been patented by Du Pont's Ralph Iler (U.S. Pat. 2,726,961): 10-50% silica (10-130 micron particles, Du Pont's Ludox) is added to a wax emulsion.

•

Amine Chasers: Further evidence of Phillips Petroleum's interest in insect repellents: Lyle Goodhue and Carolyn Tissol's amines for discouraging roaches. The compounds (U.S. Pat. 2,726,980) are made by reacting 1,3-butadiene with ammonia.

•

Woman of Vision: A composition (U.S. Pat. 2,726,962) for preventing the fogging of windshields, goggles, and the like is the invention of Gabriella Iorio. The compound is composed of 10-30 parts wetting agent (polyoxyethylene sorbitan monooleate and polyoxyethylene sorbitan monolaurate are suggested), 5-15 parts emulsifying agent (polyoxyethylene sorbitan monostearate or polyoxyethylene sorbital pentaoleate) in a solvent (aliphatic naphtha and mineral spirits).

EXPANSION . . .

Suds Shift: Stanson Chemicals (Edgewater, N.J.), maker of Stanzal and Stanson Suds, controlled-suds detergents for the home laundry trade, has moved to new and larger quarters in Edgewater. Private-label production will be a new aspect of the business.

•

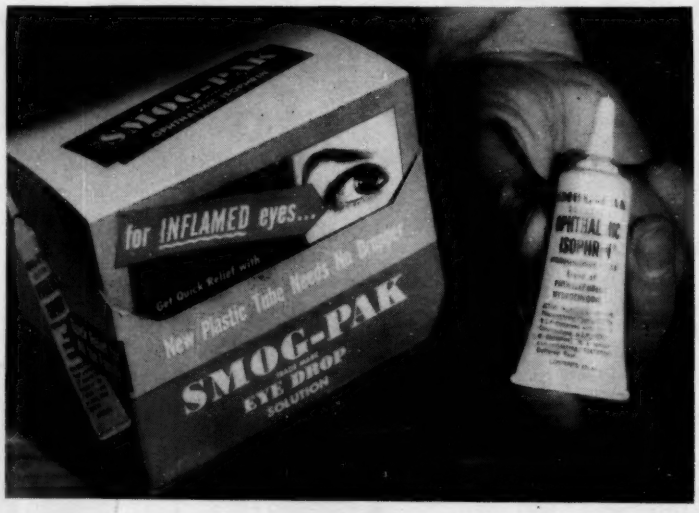
New Waxworks: Concord Chemical Co. (Moorestown, N. J.) is buying the plant and major assets of Standard Soap Co. (Camden, N.J.), will move its wax specialties operation into the new quarters. Standard will be a division of Concord, will continue to make and market its line of laundry soaps, cleaning compounds, disinfectants and textile specialties.

PRODUCTS . . .

Rug Duster: Karpet Kare, Bigelow-Sanford Carpet Co., Inc.'s absorbent powder cleaner for rugs, is to go on the consumer market as Sprinkle Clean. So far, the product has been sold only in bulk to franchised cleaners (under the name Karpet Kare). The detergent product contains a "built-in soil retardant" that, claims Bigelow, doesn't harshen yarns, nor increase the tendency to crush and mat, nor affect colorfastness or durability. The retail price will be $3.95. (It will be sold, initially, only through Karpet Kare cleaners.)

•

Paint Upgrader: A new multipurpose paint additive sold by Baker Castor Oil (New York) is claimed to remain stable and effective under high processing temperatures. By developing a thixotropic gel structure in the paints, the additive is said to improve



Eye-Catching Packaging

NEW EYE DROP solution, Smog-Pak, by Broemmel Pharmaceuticals (San Francisco) proves that makers of fuel additives (*CW, Nov. 19, '55, p. 127*) are not the only specialties makers turning smog to profit. Both package and product are tailored for the smog situation in Los Angeles: the buffered isotonic solution, containing phenylephrine hydrochloride, has a slightly higher pH (6.4 instead of 6.0) than Broemmel's standard composition; container is 15 cc. Bracon polyethylene dropper tube. Unadvertised, Smog-Pak sales have averaged well over 3,000 tubes/month (at 94¢ each) since their introduction.

Blaw-Knox small-scale continuous fat splitter produces "high quality fatty acids economically and in small quantities... is easy and simple to operate"

COWLES CHEMICAL COMPANY
ESTABLISHED 1885
MANUFACTURER OF INDUSTRIAL CHEMICALS
SKANEATELES FALLS, NEW YORK

GENERAL OFFICES
CLEVELAND 3, OHIO

PLANTS:
SEWAREN, N.
LOCKPORT, N.
SKANEATELES FAL

October 11, 1955

Blaw-Knox Company
Chemical Plants Division
180 North Wabash Avenue
Chicago, Illinois

Attention: Mr. Ralph Berger

Dear Ralph:

Recently you asked me just how well our continuous, 500 pound per hour fat splitter was doing. You mentioned that many were skeptical about the performance and practicability of a system of this size, and also about the economics of producing fatty acids in such a small quantity.

I am happy to report complete satisfaction with the operation. We are producing a product equal to distilled animal fatty acids at a cost substantially below the market price. The equipment as arranged is easy and simple to operate; even forced shutdowns due to power failure without advance warning cause no difficulty.

In short, this system appears to be an ideal way to produce high quality fatty acids economically and in small quantities; and I can recommend it without reservation.

Very truly yours,

COWLES CHEMICAL COMPANY

K. R. Olson
Chief Engineer

KRO/jm

. . . efficient, economical fat splitting units, specifically designed for small scale production, utilizing the basic principles of modern processes, are recommended by Blaw-Knox

1. for supplementing larger units to avoid interruption of processing small lots of different stocks
2. for supplying small local requirements in areas that are remote from large producers.

split it continuously
and you'll split it more profitably . . .
in large or small scale operations

BLAW-KNOX COMPANY *Chemical Plants Division*
Chicago 1, Illinois / Pittsburgh 22, Pennsylvania
Birmingham, New York, Philadelphia, San Francisco, Washington, D.C.

sag resistance, brushability, pigment suspension, and penetration. Called M-P-A, the additive is a modified vegetable oil derivative supplied as a paste.

•

Papermakers' Aid: Larostat-738 is a new powdered antistatic agent for use in papermaking, W. H. & F. Jordan, Jr., Mfg. Co. (Philadelphia) makes it for use in tub-sizing. About 35 lbs. are used per 1,000 gal. of tub size.

•

Cream Soap: A thick-bodied, opaque white cream-type soap is now being marketed by Sugar Beet Products Co. (Saginaw, Mich.). For industrial soap dispensers, the soap contains an antiseptic and lanolin. Big advantage of the cream soap, according to the maker, is economy.

•

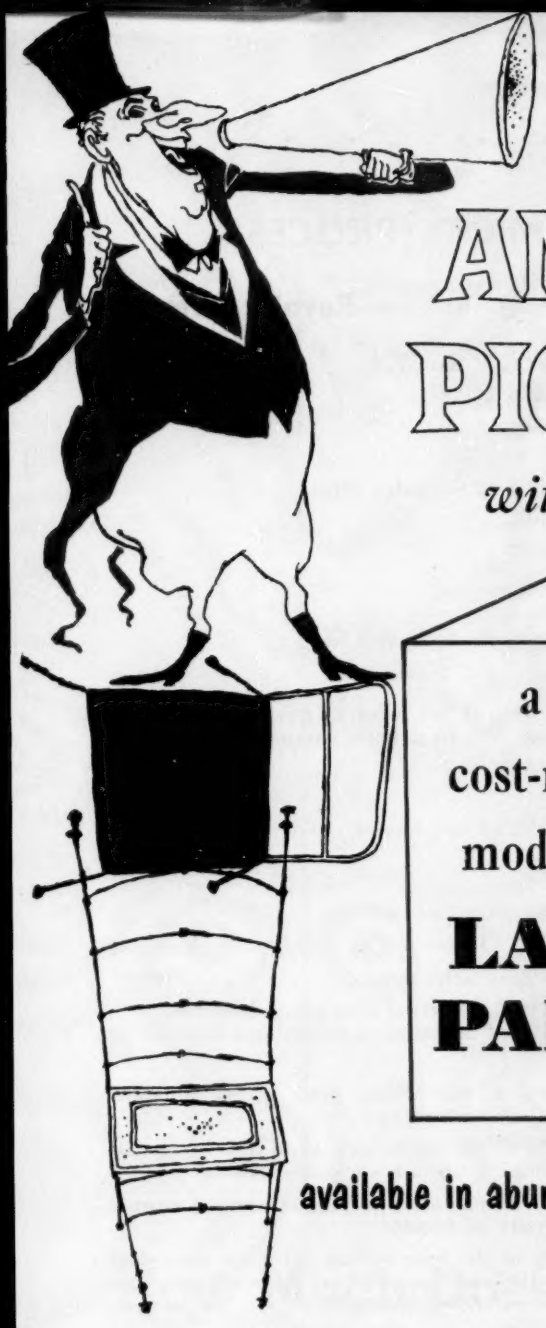
Odor Control: Another approach to deodorant manufacture has been suggested by W. B. Shelley and M. M. Cahn, Philadelphia physicians. They propose (and have tested samples of) underarm deodorants made of the antibiotic neomycin in a cream base. The compound works by killing bacteria that produce odor when they act on perspiration.

•

Germ-Killing Rinse: Parlee Co., Inc. (Indianapolis) is now selling a rinse-water additive, Saniwash, designed to reduce dust, kill germs and fungi. The compound is a combination of an anionic oil emulsion and a cationic germicide emulsion. It's claimed to be neutral in color and odor, and to resist further washings. Saniwash is now sold largely for institutional use; consumer sales are by mail only.

•

Long Grind: Designed to prolong the cutting life of abrasive belts, Armor-Kut, a new grinding aid, has been put on the market by Armour and Co.'s Coated Abrasives Division (Alliance, O.). Armor-Kut has been developed particularly for use in titanium grinding. A thick, red, oil-like substance, it is used at 120 F temperatures. When used on titanium, it reacts with the metal at the grinding surface to produce a protective layer that improves the finish, speeds cutting, Armour says. The compound is also claimed to increase abrasive belt life up to eight times.



ANNOUNCING PICCOPALE A-1

with TEN big advantages for you

a new cost-reducing modifier for LATEX PAINTS

available in abundant supply

1. ***Improved paint quality*** National paint manufacturers, field-testing Piccopale A-1, convinced themselves that this new modifier definitely improved the quality and reduced the cost of their paints.
2. ***Excellent soil removal*** Soil is readily removed from paints of high pigment volume, made with Piccopale A-1 Emulsion.
3. ***Alkali-resistant*** The low soap-to-resin ratio of Piccopale A-1 Emulsion, plus its hydrocarbon composition, give it outstanding resistance to soap, water and alkalies.
4. ***Compatible*** Piccopale A-1 Emulsion is easy to use, being compatible with protective colloids, thickeners, pigments, modifiers.
5. ***Flexible*** Plasticizing action gives permanent flexibility to styrene-butadiene paint films.
6. ***High Adhesion*** Latex paints modified with Piccopale A-1 have good initial adhesion.
7. ***Water-resistant*** The excellent early water-resistance of Piccopale A-1 modified latex paints is due to the hydrophobic nature of Piccopale. Dried films are unaffected by water.
8. ***Stable*** Package stability is very good, because Piccopale A-1 Emulsion is non-creaming at both 50% and 10% solids.
9. ***Uniform*** The uniformity of Piccopale A-1 Emulsion is enhanced by the small particle size, less than 1.0 micron.
10. ***Low Cost*** The low cost and abundant supply of Piccopale A-1 Emulsion enable you to expand your product lines.

Ask for "Picco Field Service"

Pennsylvania Industrial Chemical Corp.

Clairton, Pennsylvania

Plants at:
Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

District Sales Offices
Boston, New York, Detroit, Cincinnati, Chicago
Los Angeles, Philadelphia, Pittsburgh

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION — PICCO

Pennsylvania Industrial Chemical Corp. (CW)
Clairton, Penna.

Please send me further information on PICCOPALE A-1 EMULSION.

Name_____ Position_____

Company_____

Address_____

ROYALTY RATES FOR CHEMICAL PROCESS

	No.	Product or Process	Royalty Rate
On percent of net profit	1	2-sulfanilyl-aminopyridine	50% of net profit
	2	Food processing	34%
	3	Cellulose acetate fibers	25%
On percent of net sales	4	Petroleum cracking catalyst	5% of net sales value
	5	Sulfadiazine	5%
	6	Molded bakelite radio sockets	5%
	7	Electrical equipment parts	5%
	8	Concentrated citrus juices	2½%
	9	Streptomycin	2½%
	10	Crude rubber	2½%
	11	Polysulfide synthetic rubber	2½% of net sales to government during war; 5% to private companies after war
	12	Soluble coffee	1½%
On percent of gross sales	13	Drilling mud control and treatment	5% of gross sales
	14	Vitamin B	5%
	15	Petroleum emulsions	2½%
	16	Corrosion-resistant clad steel	10% of base selling price
	17	Carriers	5% of sales price
	18	Styrene	2½% of actual sales price (captive) 5% of actual sales price (noncaptive)
On percent of sales with modifications	19	Cheese-wrapping material	10% of net selling price to certain date, 5% thereafter
	20	Molded radio sockets	5% of net sales with a minimum annual sale of 1 million sockets specified
	21	Sponge rubber products	5% of net sales with a minimum annual royalty of $4,000
	22	Corrosion-resistant clad steel plates and sheets	5% of the base selling price for clad steel of 10% or less, 10% of base selling price for clad layer over 10%
	23	Copper-brazed tubing	5% of all sales to $1.5 million, then 4% to $3 million, and 3½% thereafter
	24	Metallic powders	5% of the sales price up to 200,000 lbs./month, 2% thereafter
On rate per unit product	25	Fruit packaging medium	10¢/case
	26	Polysulfide synthetic rubber	0.125¢/lb. made for the government
	27	Styrene	0.125¢/lb. made for the government
	28	Feeds and fodders	Different rate for each product
On rate per unit of raw material	29	Coal carbonization	1¢/lb. of coal delivered to the retort

	No.	Product or Process	Royalty Rate
On rate per unit with modifications	30	Finishing materials for coated metal surface	0.25¢/lb. with a minimum selling price of 8¢/lb.
	31	Pigments and fillers	royalty rate / selling price
		(a) Synthetic pigments	0.5¢/lb. — 8¢/lb. (or more) 0.2¢/lb. — over 5¢/lb. 0.25¢/lb. — over 3¢/lb. 0.1¢/lb. — less than 3¢/lb.
		(b) Natural and mined pigments and fillers	0.2¢/lb. — 3.5¢/lb. or less 0.3¢/lb. — over 3.5¢/lb.
		(c) custom-ground natural-mined material	0.2¢/lb.
	32	Polysulfide synthetic rubber	2.36¢/lb., such rate never to be less than 3% of the net selling price
	33	Citrus juices	7.5¢/gal. for first million gallons/year: 5¢/gal. for the second million gallons; 2.5¢/gal. for the third million gallons; 0.1¢/gal. thereafter. Minimum annual royalty: $75,000
	34	Lubricating oils	3.5¢/lb., adjusted to the index of wholesale commodity prices and chlorine content
On combination factors	35	Catalytic petroleum refining (a) fluid cat cracking	5¢/bbl. of fresh feed stock, plus 5¢/bbl. of aviation product and 3% of the price of any other special liquid products
		(b) hydro cat reforming	5.5¢/bbl. fresh feed stock, plus 5¢/lb. of aviation product and 3% of price of any other special liquid products
	36	Insecticides (DDT) Insecticidal compositions	5% of net sales with a maximum rate; or 0.04¢ for each 1% of DDT content up to (and including) 10%; 0.0333¢ for each 1% of DDT content thereafter

How Much Does a Process Cost?

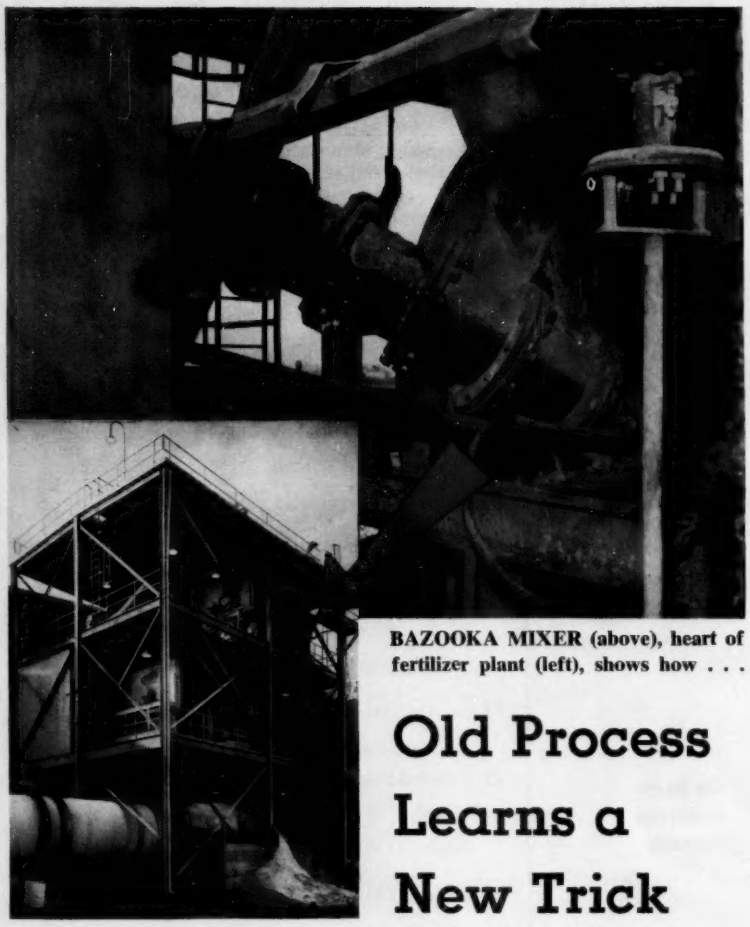
When you're buying something—a new car, a tank car of chlorine or a complete chemical process—you're interested primarily in value received for money expended. In the case of a new car or a shipment of chlorine, you can always find a standard for comparison. But it's a different story when you're buying a chemical process. The record on the payment of royalties is practically nonexistent.

But with the trend toward diversification, with new companies entering the industry, and with old companies branching out into new lines, the buying and selling of complete chemical processes is decidedly on the upswing.

With that in mind, *CW* last week asked Robert Aries (president of the New York consulting firm, R. S. Aries & Assoc.) to tabulate the royalty payments (*see above and preceding page*) for 33 contracts contained in his library. (These are contracts the organization has collected over a period of time, do not cover projects in which the Aries firm played a part.)

As you'd expect, the tabulation clearly indicates that the method of payment varies considerably. Some of the variables that affect the payment: type of product, market situation at the time, and exact amount of know-how contributed by the licensor. In general, however, most of the processes are based on the sales of the product, vary between 2½% of the net to 10% of the gross.

Other things you should keep in mind when assessing the figures is that equipment manufacturers or constructors usually include a fee for process know-how in the cost of putting in the facility. And most consultants prefer to charge a flat fee for time spent in performing a service, rather than to share in the proceeds from the resulting product.



BAZOOKA MIXER (above), heart of fertilizer plant (left), shows how . . .

Old Process Learns a New Trick

Old adages notwithstanding, fertilizer producers are convinced that you can teach an old dog—or an old mixing process—new tricks. And they're proving their point through lessons in continuous operation, automatic handling, and electronic control. Latest to complete the course in modern techniques is Stauffer's new $900,000 Los Angeles plant.

Individually, none of the operations employed in the new fertilizer mixing plant could be classified as a striking innovation. But collectively they illustrate what up-to-date know-how can do with old ideas.

Basically the plant is designed to combine ammonium sulfate or phosphate with aged single superphosphate, potash, and other special additives as required. With raw materials such as these, efficient bulk handling is vital at all stages of processing. As others with similar problems have done (*CW, Oct. 30, '54, p. 62*), Stauffer makes maximum use of automatic conveying equipment. Consequently, labor requirements in the new plant are less than 0.1 man-hour/ton, production rate is 30-40 tons/hour.

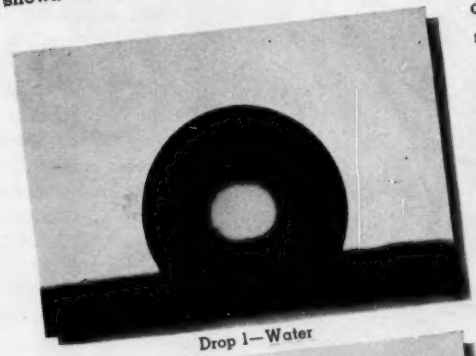
Control Key: Masterminding the entire mixing process, a system of interlocking electronic controls feeds solid raw materials from five large storage hoppers to a conveyor belt. The adjustable weighing system can be set to deliver 25-350 lbs./dump to the belt at the rate of one dump every 15, 20 or 30 seconds. Any over- or underweight dump immediately "freezes" the entire mixing operation, halting both the dry and the liquid feed systems until the situation is corrected.

The belt conveyor discharges solid ingredients to a bucket elevator, which feeds them to an elevated rotary reactor. At this point in the process, materials are mixed with anhydrous ammonia and either sulfuric or phos-

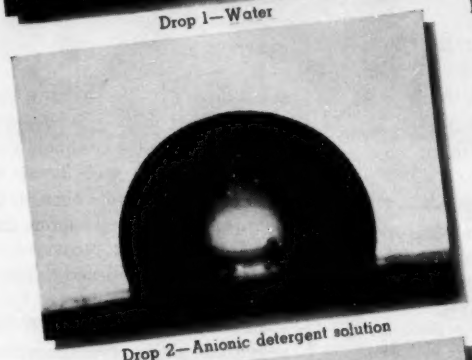
How does TRITON X-100 clean so many surfaces?

TRITON X-100 is a Rohm & Haas non-ionic detergent exceptionally effective as a cleaner for hard surfaces such as aluminum, steels, copper, brass, zinc, iron, ceramic tiles, hard rubber, linoleum, glass and many plastics.

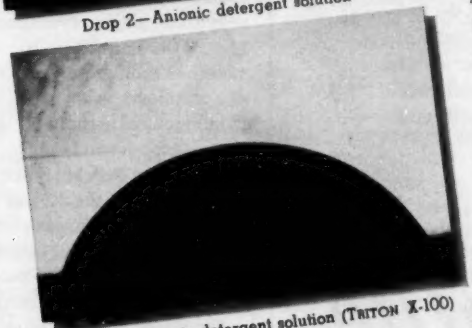
One important reason for the all-inclusive cleaning power of TRITON X-100 is its ability to *preferentially* wet the surfaces it cleans. This phenomenon is graphically illustrated in the micro-photographs shown here. They show a typical substrate (steel in this particular case) completely immersed in oil. Individual drops of anionic and non-ionic detergent solutions have been placed on the steel plate with a micropipette. For comparison —a drop of water is also shown.



Drop 1—Water



Drop 2—Anionic detergent solution



Drop 3—Non-ionic detergent solution (TRITON X-100)

Drops #1 and #2 retain their semi-globular shape—they show a high contact angle between the drop and the test surface. The water and the anionic solution are unable to displace the oil film from the steel surface and therefore their cleaning power is limited.

Drop #3 (TRITON X-100 solution) has flattened out It hugs the surface and shows a low contact angle It is able to wet the surface *preferentially*—it displaces the oil film from the surface and therefore, does a better cleaning job.

TRITON X-100 is such an effective and universal cleaner because its solutions immediately develop a low contact angle with <u>many</u> surfaces; because it quickly wets substrates; and because its solutions readily displace soil from the surfaces; and finally, because TRITON X-100 can be easily rinsed off—leaving a sparkling clean surface.

Further information on test procedures for laboratory evaluation of hard surface detergency is available upon request.

TRITON is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

phoric acid, which are premixed and fed to the reactor by a continuous ammoniator.

The ammoniator—or bazooka—is a fairly common piece of equipment for mixing liquid ingredients. It's a lined, specially constructed tube, tilted at a 45-degree angle and baffled to provide complete mixing. Ammonia enters the tube directly, but to aid turbulent mixing, acid is fed in tangentially. Introducing the liquid as ammonium sulfate (or phosphate)—instead of depending on three-way internal mixing of solids, ammonia and acid in the reactor—is the key to Stauffer's continuous process.

Small amounts of water are added to the reactor as needed to aid in subsequent pelletizing. Excess moisture is flashed off at the relatively high temperature (about 215 F) attained during the exothermic mixing reaction.

Fast Pass: Passing through the reactor in less than one minute, the material enters a second rotary drum, which completes pelletization in about one more minute. The pelletized fertilizer then goes through a dryer and a cooler. Prior to packaging, the product may receive additions of sulfur, insecticides, trace minerals, and other agricultural chemicals or soil conditioners.

If any feature of the plant qualifies as unique, it's the electrostatic precipitator that cleans exit gas from the system. Built to the company's own design, it's the first such device to meet the Los Angeles Air Pollution Control Board's stringent regulations for fertilizer plants. Fines recovered by the precipitator are returned to the mixing reactor.

Initially, the plant will produce pelletized single superphosphate, 5-15-0, 10-10-5, 10-10-10, and 17-7-0 mixes. Production can be changed to accommodate demand, but it's not economically feasible to produce all the possible formulations.

Boost for Pellets: Since pelletizing is generally too costly for the average small producer, large plants have a decided competitive advantage. For it's likely that the Western market for pelletized low- and medium-analysis fertilizers will continue to grow as range land fertilization comes into greater use (*CW, Nov. 27, '54, p. 113*). So it's a good bet that fertilizer plants will continue to learn new cost- and labor-saving tricks.

WSW 5927

Soft to touch—and beautiful, too

NO wonder our young lady is satisfied to just curl up and enjoy herself before taking to the road in her new convertible. It's the first time she's ever rubbed cheeks with soft, comfortable vinyl upholstery . . . and she *likes* it!

As the mileage builds up, she'll discover some other very pleasant facts about vinyl: Its durability is amazing . . . it outwears all other upholstery materials. It won't fade, crack or peel. And a pass of a damp cloth keeps it spotless.

But her big blue eyes will really pop when she discovers how soft and supple it stays, right around the calendar. And for that, she can say thanks to *plasticizers*, the flexibility ingredients in vinyl plastics.

We mention plasticizers because they're one of the many coal-derived chemical products we make for industry. While their principal role is keeping plastic products like upholstery, garden hose and vinyl floor tile flexible under all conditions, certain plasticizers also impart such special properties as resistance to heat, sunlight and oil in finished plastic products.

To meet these diverse needs, Pittsburgh produces one of industry's most complete families of vinyl plasticizers—*Pittsburgh PX Plasticizers.* And our research laboratories are constantly at work developing new and better plasticizers . . . and application practices that are more efficient and economical.

If your company uses plasticizers—or any other coal-derived industrial chemicals—let us acquaint you with the unique advantages of buying from Pittsburgh, *a basic and integrated producer.*

PITTSBURGH
COKE & CHEMICAL CO.

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

PRODUCTION . . . . .

EQUIPMENT

Compressed Gas Dryers: Kahn and Co., Inc. (Hartford, Conn.) is out with a new line of dryers designed to dehydrate compressed air and other gases to a dew point of —50 F or lower. Units operate continuously by alternating gas stream between twin adsorption towers, each capable of handling total flow while the other is being reactivated.

•

Liquid-Feed Blender: For fast, uniform blending of difficult liquid-dry mixtures, The Patterson-Kelley Co., Inc. (East Stroudsburg, Pa.) has developed a new device for introducing liquids into its p-k twin shell blender. The unit consists of an improved intensifier bar through which liquid flows to disks mounted on the bar. Disks are set at an angle to the centerline of the shaft, provide effective dispersion of liquids by combined slinging action of centrifugal force and wiping action of dry material.

•

High-Temperature Gauge: Callery Chemical Co.'s (Pittsburgh, Pa.) new Model C high-temperature pressure gauge has been designed to withstand prolonged exposure to both heat and radiation. The instrument is not temperature sensitive, operates by measuring change in electrical output of a differential transformer, the core of which is linked to a pressure-sensing bellows.

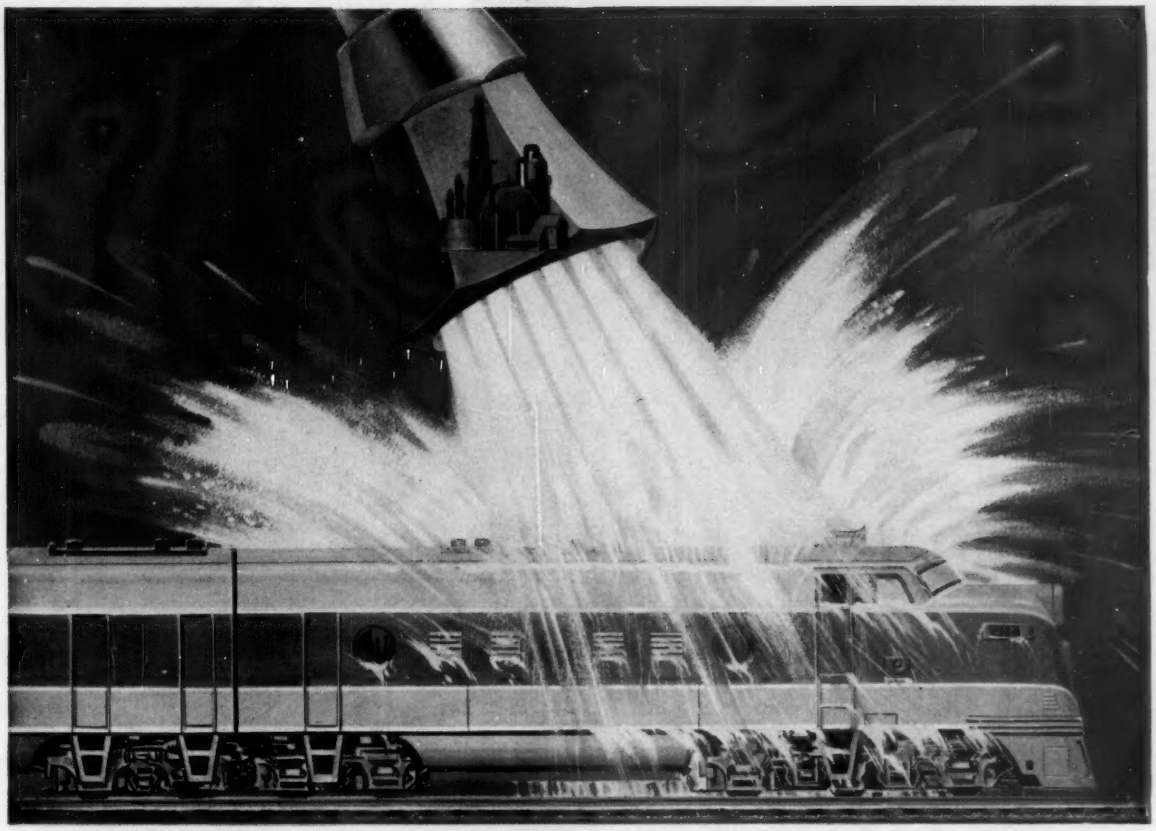
•

High-Flow Filter: Efficient filtration with low pressure drop is the goal of the Model 3116 industrial filter now available from Arrow Tools, Inc. (Chicago). Suitable for bulk handling of water, chemicals, petroleum products, and compressible fluids, it utilizes a permanent, porous, bronze filter element to remove solid particles down to 6.5 microns in size.

•

High-Speed Screen: Hewitt-Robins, Inc. (Stamford, Conn.) is offering a new high-speed vibrating screen that, it says, is 30-80% faster than previous mechanical screens. Dubbed HS Vibrex, it's specially designed for cloth of 10-80 openings/lineal inch; provides speeds of 3,300 rpm. at 1/32-in. stroke, 2,400 rpm. at 1/16-in. stroke.

The unit screens wet or dry products, can be electrically heated to prevent clogging with damp materials.



FOR THAT CLEAN-AS-A-WHISTLE LOOK

Giving a train a shower and shine is an everyday affair for railroads. The trick is to do the job with minimum effort and get the train back to work promptly.

That's where the Atlantic Ultrawets come in . . . the Ultrawets provide outstanding cleansing properties. Gritty, greasy particles of dirt rinse off easily, leave a streak-free finish that dries shining-clean.

These superior synthetic detergents are one of a group of Atlantic petrochemicals (so you see a miniature oil refinery in the picture).

Naturally, these unusually able Ultrawets are also used in formulations for many other operations: from shampoos for milady to wetting agents in textile mills.

The Ultrawets are one part of Atlantic's ever-growing family of petrochemicals, for which industry is constantly finding new and profitable uses . . . in new products . . . in cost-saving manufacturing advantages . . . in adding new sales-pluses to well-established products. Atlantic sales engineers are always ready to help your staff get the most from your use of Atlantic petrochemicals.

For full information on Atlantic petrochemicals and services, write to The Atlantic Refining Co., Dept. H-22 260 South Broad St., Philadelphia 1, Pa.

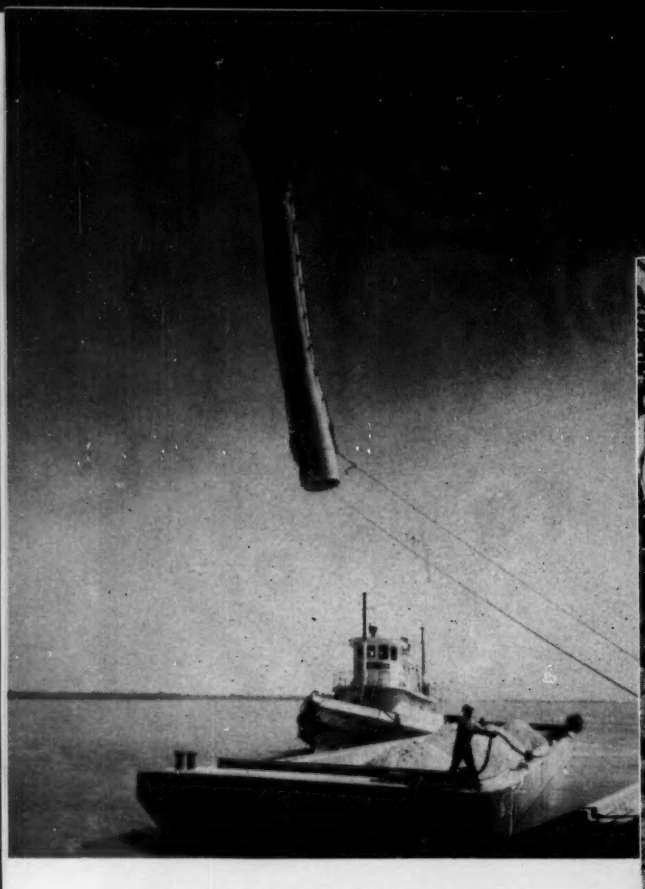
ATLANTIC PETROLEUM CHEMICALS

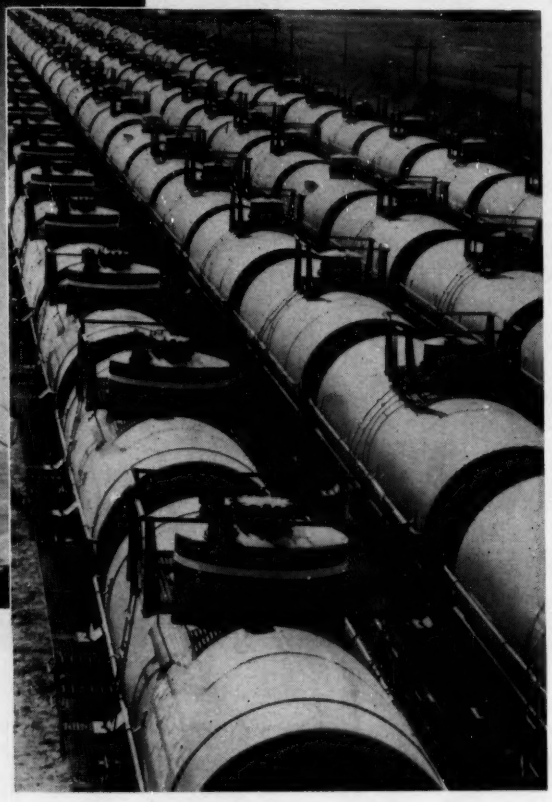
Philadelphia, Providence, Charlotte, Chicago

In the West: L. H. Butcher Co.

In Canada: Naugatuck Chemicals Division of Dominion Rubber Company, Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium





BY SEA, BY RAIL, by road, traffic costs may soon soar again. Struggling with this problem, some chemical traffic managers are asking . . .

Can Actuaries Hold Down Shipping Costs?

With prospects of a general 7% freight rate hike never brighter and rail rate increases already scheduled for Feb. 25, chemical traffic managers are now redoubling efforts to slim costs. While traditional cost-paring methods* will probably predominate, off-beat approaches, too, may get more intensive use—for example, leasing tank cars and barges from insurance companies.

Du Pont, when deliveries are completed, will be leasing 365 cars (mostly tank) from Connecticut General Life (Hartford). Recently, Diamond Alkali leased 45 tank cars (value: $530,000) from Mutual Life (New York), boosting its total leased from Mutual to over 150. And other firms are actively studying the question.

Low rental appears to be the chief reason for leasing from insurers. Even competitors, such as General American Transportation Co. (GATX), concede that insurance company rental rates are lower. Then there's the "freeing of capital for use elsewhere" advantage inherent in any leasing arrangement. Savings afforded by insurance companies, however, must be considered in light of contract terms, and advantages of hiring directly from car manufacturers such as GATX and Shippers Car Line.

How It Works: Chemical companies first determine the equipment to be purchased. Then, the insurance firm buys it, leases it back to the user for the depreciable life of the equipment. Generally, the insurers will not make deals for less than $200,000 worth of equipment. Although most contracts cover new stock, some insurance firms will consider purchase and subsequent leasing of used equipment.

The contract vests title in the insurance company. Maintenance responsibility falls on the lessee—the chemical company must pay for all repairs, cleaning, painting and insurance just as if it owned the car. The lessee keeps his own mileage records. The insurance company naturally insists on an inspection-right and power-to-order-repair clause.

Under terms of the agreement, subleasing is possible and car travel isn't restricted to the U. S. Some deals do not include contract-breaking procedures, but negotiation could probably

*These include locating new plants on waterways, increased use of water transportation, larger shipment size, and company-operated truck fleets *(CW, Jan. 7, '56, p. 60)*.

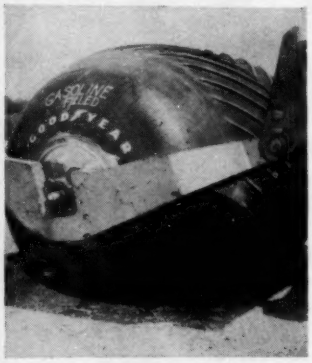
resolve this question should it arise.

Cost-cutting opportunity, of course, hinges on the rate. This, in some cases, is figured as a percentage of the cost of the equipment, and is payable periodically over the length of the contract. Low rates are highly contingent upon the credit standing of the lessee. Too, insurance firms will offer still further reduced rates on renewal agreements.

Making such an insurance company arrangement for tanks may not be easy. The titans of statistics are more interested in barge and auto fleet leasing, have only limited amounts of capital for tank-car leasing. Thus chemical companies may have to shop around.

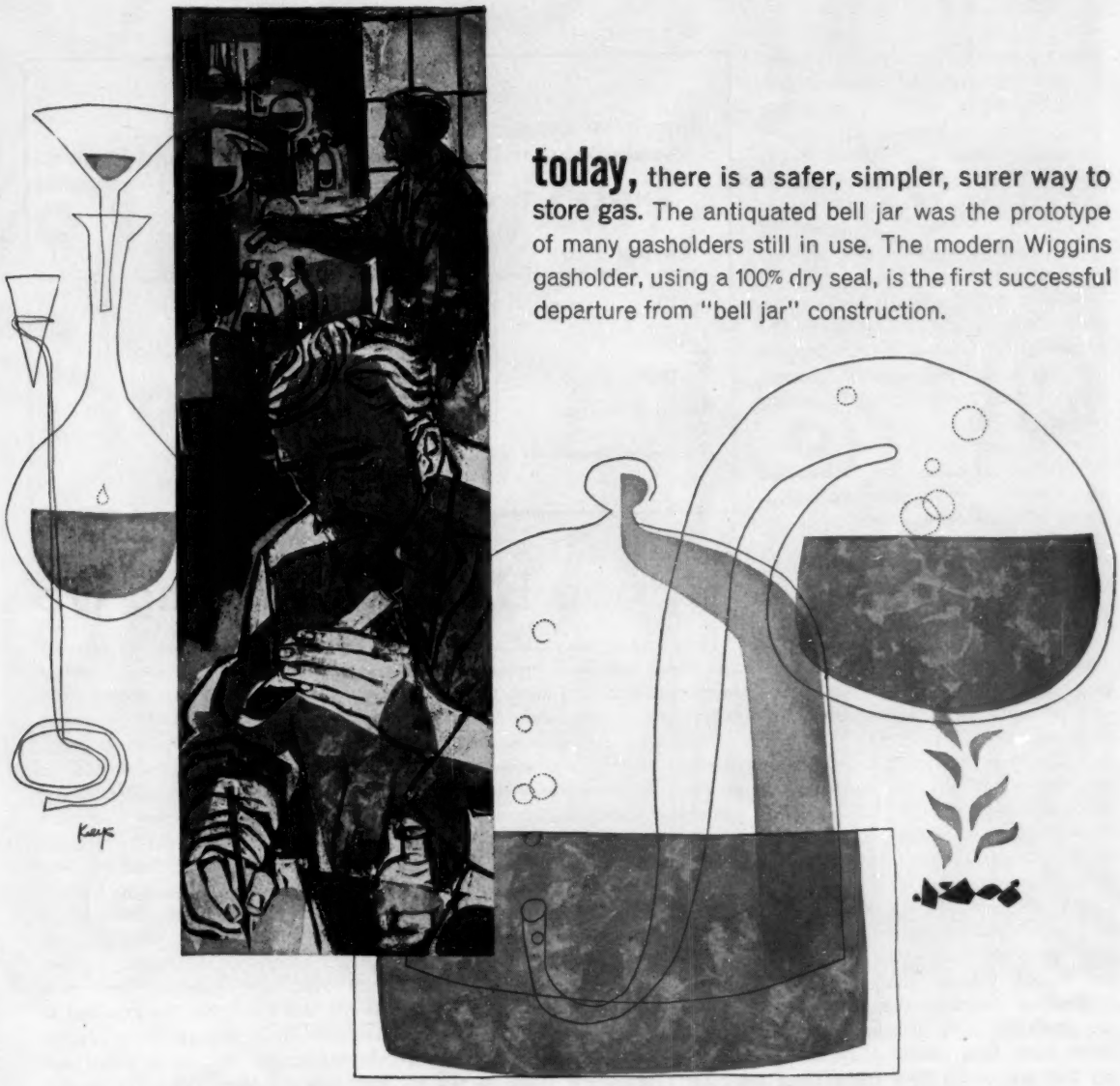
• (Interestingly, insurance companies have done much of their leasing to railroads. Freight cars, locomotives and other equipment leasing by the carriers is well established. Tank-car leasing to chemical companies, however, is comparatively recent.)

Does It Really Pay? Despite the satisfaction of current lessees with



Storage by Tire

ROLLI-TANKER—that's the name Goodyear is giving to its latest entry in the liquid storage arena. Sausage-shaped, the new flexible unit is made of nylon cord and tread stock construction with an inner, liquidproof lining. The size shown (3½x5 ft.) tares 40 lbs., holds 250 gal., and requires only 30 lbs. of drawbar pull, empty. Fully loaded tanks have been dropped 15 ft. without bursting and can be towed over uneven terrain by hand or vehicle.

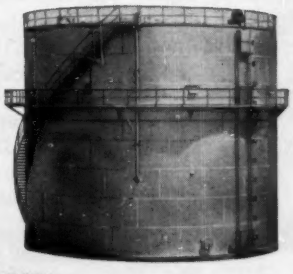


today, there is a safer, simpler, surer way to store gas. The antiquated bell jar was the prototype of many gasholders still in use. The modern Wiggins gasholder, using a 100% dry seal, is the first successful departure from "bell jar" construction.

WIGGINS GASHOLDER

BY GENERAL AMERICAN

Only modern Wiggins Gasholders free you from weather worries and operating costs. More than 150 satisfied users now enjoy the advantages (no water, tar or grease) that this 100% dry-seal gasholder offers. The Wiggins Gasholder can be built to any capacity . . . with remarkable savings in construction cost. If there's a gas storage structure in your firm's future, write today for full information.



for chemical process and industrial gases

WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street
Chicago 90, Illinois

Offices in Principal Cities

their low-rate, free-capital-to-work-elsewhere deals, some chemical producers doubt the reality of the saving, as do some established car lessors, particularly those who stand to lose if insurance financing mushrooms.

GATX, particularly vocal among the leading opponents, sums up the non-insurance-company side of the current controversy.

- Full maintenance is included in contracts with car leasing firms. In leasing from insurers, the lessee takes the gamble that his maintenance costs won't exceed those figured into rates charged by regular lessors.
- Manufactured cost of the tank car is basis of calculation for regular car lessors; insurance companies figure charges on the sale price to them.
- Credit standing of lessee does not enter into determination of charges by established car lessors.
- Number and cost of the cars leased aren't factors in direct rental deals. GATX, for instance, will lease one or more cars, provide extras in peak seasons.
- Car leasing concerns know within one day where any car is, maintain mileage records to aid calculation of return-mileage payments. Some firms do this, anyway, but insurance companies require lessees to do it.
- Changes in tank cars necessitated by new Interstate Commerce Commission edicts are made by at least some car lessors, without charge.

Whether insurance company deals are profitable is a question needing much more than casual study. Some say they are, others have reservations.

To the case for the car manufacturer lessor, some chemical traffic men add an argument of loyalty. Its essence: "We've been doing business with car producers for many years, still have to buy some cars. They've seen us through hard times, helped us solve car design problems. We're not going to desert them now."

Pros and cons aside, insurance companies do offer an intermediate position between direct leasing and outright ownership. The lessee pays for maintenance service and depreciation as it occurs, finances the equipment at insurance company rates. And under certain conditions, leasing could offer traffic managers one method to clip budgets, ease effect of upcoming freight boosts.

Japanese chemical shipments* during 1955 . . . scaled higher in three major areas, slipped in one.

HERE'S A TWO-YEAR COMPARISON:

Shipped to	1955	1954
U.S.	$5.6	$3.3
Canada	0.1	0.09
Europe	5.4	2.65
Latin America	6.2	6.7

*Estimated in millions of dollars.

Nippon Exports Inching Up

Fear among some chemical sellers that Japan will be a serious threat to worldwide U.S. chemical markets in 1956 is more fancy than fact. That's what figures just released reveal. It's true that Japanese companies are stepping up sales in European and Western Hemisphere markets, but there's little to substantiate the belief that a "big push" is actually on.

In '55, sales* to the U.S., Europe and Canada increased somewhat, slipped slightly in Latin America (*see chart*). Reading a threat to U.S. markets in these figures is elephant-quaking-at-a-mouse behavior. The entire Japanese export of chemical goods to *all* countries amounted to only $78 million (about half the sales figure for one medium-size American company). Of this total only about 22% was garnered from Europe, Latin and North America.

For the most part, Japanese chemicals don't compete with American products. Actually, only caustic soda, liquid chlorine, hydrochloric acid, calcium carbide usually undersell U.S. chemicals. In general, these products are relatively inexpensive because their raw materials are cheaper in Japan. For manufacturing other chemicals, however, raw material must be imported, thus keeping prices high.

Expensive coal and lack of sufficient electric power depressed Japanese chemicals sales in the early fifties. With the import of lower-priced foreign coal, additional generators, and a switch to heavy oil by many industries, Japanese overseas sales increased in '54-'55, are still climbing.

Looking ahead, most Japanese companies consider their brightest prospects lie in South America. Best customers last year: Brazil, $3 million; Argentina $2.7 million; Mexico $0.25 million. Other good buyers included Cuba, Uruguay, Venezuela, Colombia, Peru and Panama. This year Brazil and Colombia are expected to increase their imports from Japan. Argentina, on the other hand, will probably cut down. Over-all sales outlook for Latin America in '56 is for a 10 to 20% improvement—to the $7-8 million mark. Top sellers: plastics, dyestuffs and medical products.

U.S. imports from Japan will probably remain in the $3-4 million range in '56. This figure is small compared with return traffic—some $30 million, which Japan pays for U.S. organic solvents, pharmaceutical intermediates, etc.

Best Japanese record was chalked up in Europe, where sales grossed almost twice as much in '55 as in '54. However, increased competition from resurging European industries will slow the pace this year, probably keep sales in the neighborhood of $6 million —typical of the low Japanese hurdles in the path of U.S. chemical exporters.

*Figures are for pigments, paints and varnishes, drugs and pharmaceuticals, chemical fertilizers, organic chemicals, industrial chemicals, and specialties. They do not include monosodium glutamate.

The above photo (courtesy of the New York plant of Sinclair & Valentine Co.) shows a molybdated toner being added to printing ink. This pigment is possible because . . .

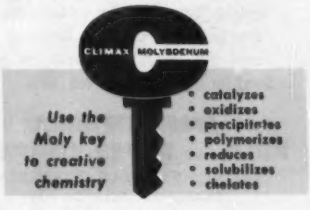
Moly makes big molecules

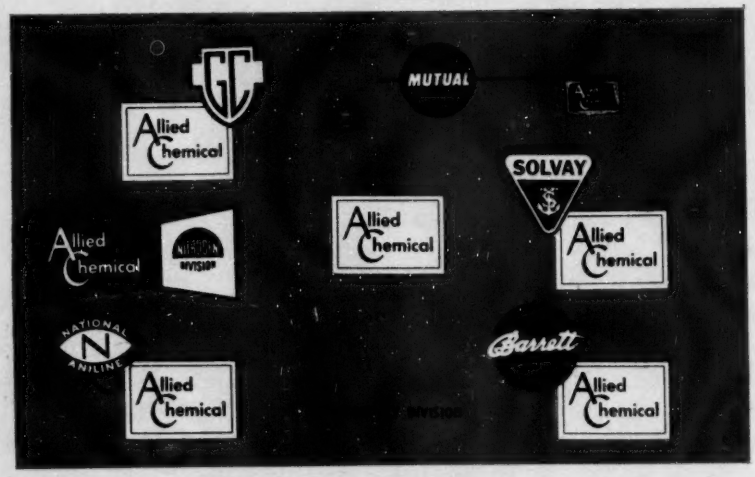
Molybdenum forms compounds of high molecular weight, such as $Na_3PMo_{12}O_{40}$. These phosphomolybdates precipitate organic bases. They convert basic dyes into brilliant pigments for paints and printing inks. This property may also find use in modifying amino and amide-type polymers, or in forming mixed organic-inorganic plastics.

Silicon, iodine, vanadium, tungsten and many other elements form similar heteropolymolybdates. Many of their heavy metal salts are soluble in both water and organic solvents. This property may be important in sequestering or extracting metals.

Can you use these unusual properties? Write for our bulletin: "Industrial Applications of Molybdenum Chemicals." Climax Molybdenum Company, Dept. 28, 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM





Label Link for Unity

Speculation in the chemical industry that Allied Chemical & Dye will soon plunge into consumer product manufacture may soon become more rife.

Its new ad symbols (logotypes) de-emphasize divisional names, stress the corporate tag, Allied. This is yet another phase of a drive* launched last year in national media to connect Allied's diverse divisions with the company name.

But such conjectures, says Allied, are unfounded. New products are coming, but they'll be like most of Allied's others—a jump or two removed from the consumer. The drive is connected, however, with the new products.

Basically, Allied aims to:

- End a long-standing, troublesome, somewhat costly sales problem.
- Cash in on the prestige and glamor of a name signifying an industrial giant, thus furthering acceptance of new and established products.

With new products (nylon resins, for instance) in their sample cases, Allied salesmen have been calling on customers they've never before solicited, and have run into the question, "Who's Allied?" Explanation consumes valuable interview time. And, the customer, on learning that the firm is one of the "big ones," is very apt to be embarrassed. Too, confusion between Allied's National Aniline Division and General Aniline & Film Corp. exists (*see memo, below*).

Allied's solution is its current ad campaign and integrated logotypes. This is being buttressed by window displays of security dealers across the country, employee literature, Allied signs on plants, and tie-ins on radio and TV promotion aired by the divisions.

Although the over-all program is

*This program featured a series of advertisements that presented pictorially two very different scenes (e.g., cornfield and rocket) and asked the reader "How Are They Allied?" The text then established the connection.

INTEROFFICE MEMO Jan 30 1956

AB

. . . . . met a man from Camden who is comptroller of . . . . . or head of accounting or some such. On mentioning Allied Chemical he said that's the company, isn't it, that is owned by the government and was involved with German patents? I got him straight on this . . .

CDE

20° and 22° Baumé Water White and Commercial Grades Available in Tank Car Quantities from Niagara Falls, New York

20° Baumé Commercial Grade Muriatic Acid is also available for prompt tank car shipments from Carlsbad, New Mexico.

specifications

20° and 22° Baumé Water White Grade

COLOR	WATER WHITE
IRON	0.0001% MAXIMUM
FREE CHLORINE	NONE
ARSENIC	NONE
INORGANIC SALTS	0.002% MAXIMUM
SULFATES	0.0003% MAXIMUM
ORGANIC MATTER	0.0002% MAXIMUM
SUSPENDED MATTER	NONE

MURIATIC ACID

International's Muriatic Acid is produced from inorganic materials and, at the Niagara Falls Plant, is made directly by burning hydrogen with chlorine. You can be sure of the purity, quality and consistency of grade to specifications. Muriatic Acid, in the grade and quantity you require, is available for prompt shipments. We shall be glad to send samples on request.

MINERALS International CHEMICALS

MINING•REFINING•MANUFACTURING CAUSTIC POTASH—*all standard grades;* CARBONATE OF POTASH—*all standard grades;* POTASSIUM CHLORIDE—*refined and technical grades;* SULFATE OF POTASH; LIQUID CHLORINE; MURIATIC ACID.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

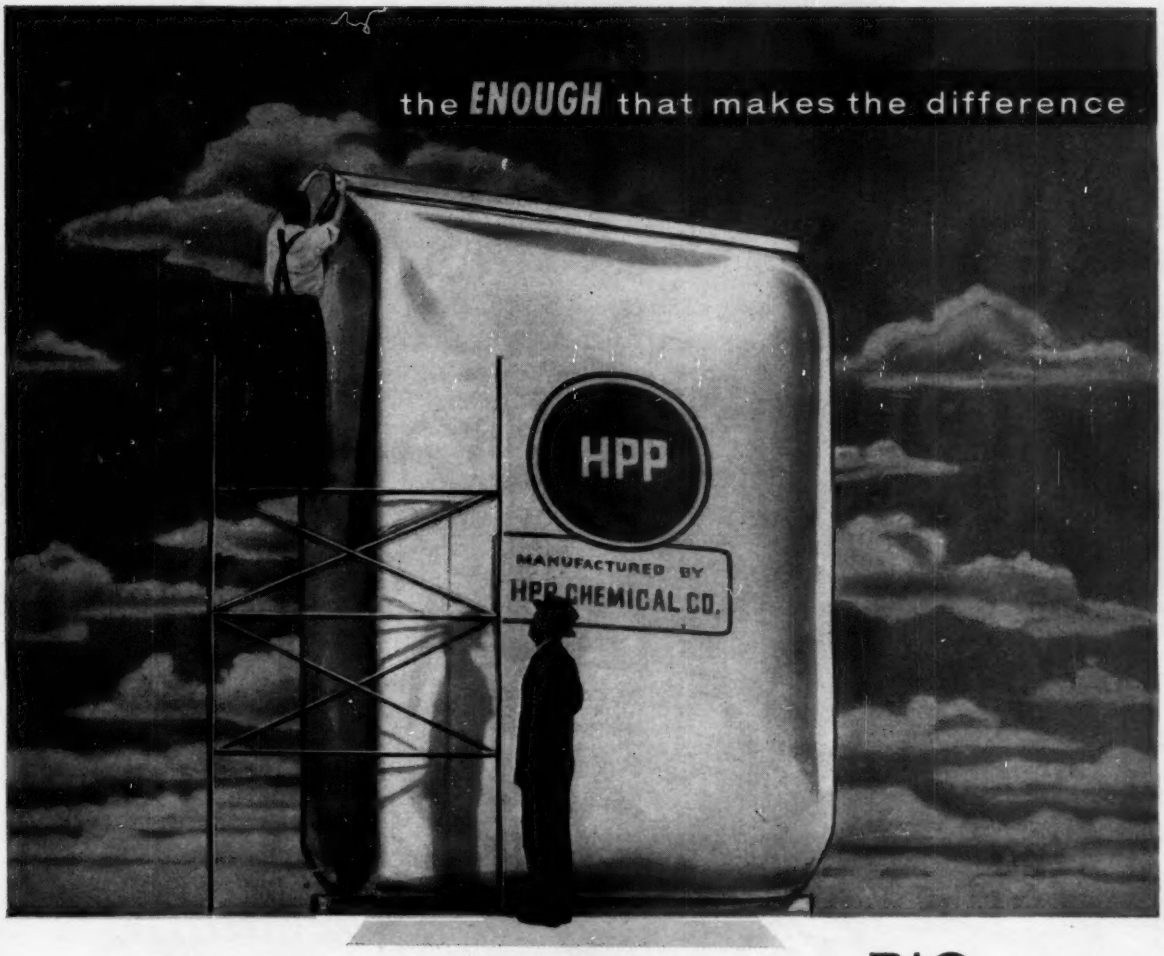
Address all inquiries to Industrial Sales Dept., Potash Division
General Offices: 20 North Wacker Drive, Chicago 6
61 Broadway, New York 6 • Midland, Texas

DISTRIBUTION. . . .

by no means complete, the payoff is already being counted. There's been a marked decrease in confusion evident in correspondence, and in the time salesmen spend in "setting people straight." And that adds up to easier going for Allied in pushing its new industrial wares.

DATA DIGEST. . . .

- **Synthetic fluids and lubricants:** 52-p. brochure describes properties, applications, and selection methods of Ucon polyalkylene-glycol derivatives for use in mechanical, rubber and textile lubes, hydraulic and heat transfer fluids, antifoam agents, and other formulations. Carbide and Carbon Chemicals Co. (New York).
- **Benzene:** data sheet SD-2 gives necessary information for safe handling, use, storage and disposal of benzene. Manufacturing Chemists' Assn. (Washington, D. C.).
- **Polyester resins:** series of bulletins provide technical data on the use of surface cure and cobalt added polyesters (No. 9-3); air cure-cobalt added (No. 9-4); air cure-cobalt added-thixotropic (No. 9-5); thickening agent (No. 23-2); color gel coats, spray or brush (No. 23-3); pigment colors (No. 35-1); and release coating separator film (No. 44-1). Interchemical Co. Finishes' Division (Cincinnati).
- **Sequestrant:** bibliography supplies abstracts of 1953-54 literature on ethylenediamine tetraacetic acid. Geigy Chemical Corp. (New York).
- **Fatty acid esters:** 1956 catalog gives physical and chemical properties of fatty acid esters of glycerol, glycols and polyethylene glycols for use as emulsifiers, stabilizers, penetrants, thickeners, defoamers and plasticizers. Glyco Products Co., Inc. (New York).
- **Synthetic rubber latices:** 8-p. folder outlines properties and applications of eight different latices. Naugatuck Chemical Division, U.S. Rubber Co. (Naugatuck, Conn.).
- **Fatty alcohols:** 11-p. booklet tabulates properties of lauryl, cetyl, stearyl and oleyl alcohols, suggests uses in adhesives, cement, cosmetics, textiles, leather, and other fields. M. Michel and Co. (New York).
- **Polyester film:** brochure on Mylar delineates new uses, provides physical data, No. MB-4. Du Pont Co. (Wilmington, Del.).



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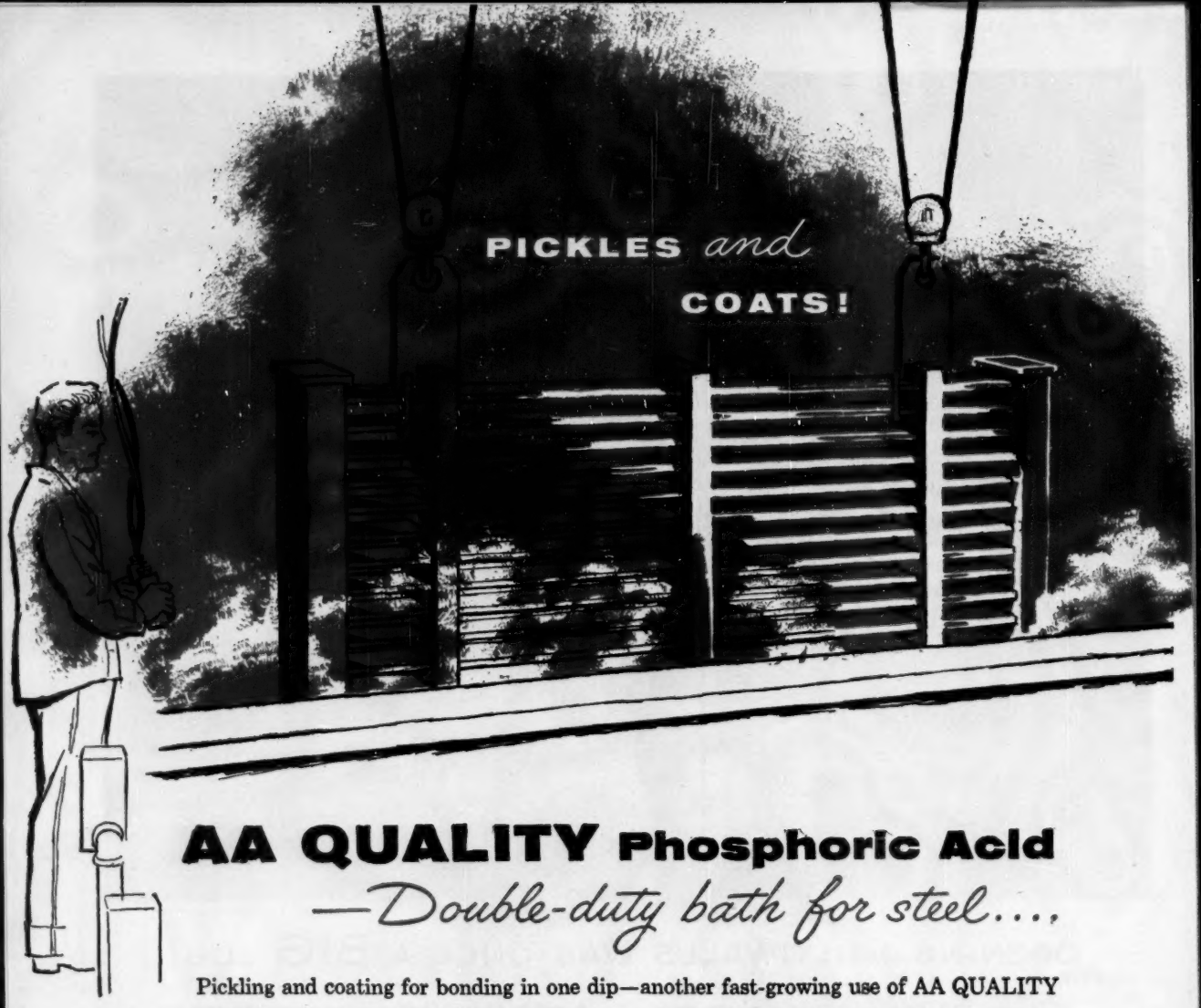

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Technology
Newsletter

CHEMICAL WEEK
February 18, 1956

Watch for some new polymerization catalysts. One that's currently undergoing hush-hush evaluation is ferrocene. After generating interest as an fuel antiknock agent, it has more recently been groomed for a job as combustion catalyst in home-heaters (*CW, Jan. 21, '55 p. 54*).

Structurally, the compound is a sandwich of two cyclopentadienyl radicals around an atom of iron. It's made by Du Pont, although Hercules has probed it for use as a motor fuel additive. Assets that undoubtedly make it a candidate for catalyst in polymerizations of olefins (e.g., propylene) are its stability and availability—and some mighty interesting catalytic properties.

Hercules may soon reveal that the catalyst it will make and sell for Ziegler-type reactions is aluminum isobutyl. Probable cost: $10/lb.

•

The Sill process for recovering metals from high-arsenic ores (*CW, Jan. 14, p. 56*) will find its pilot-plant home on a 20-acre site outside of Newburgh, N. Y. Metallurgical Resources—the firm that has been formed to exploit the process—will take title to the land in 30 days. And Nichols Engineering has already started engineering.

•

Within a few weeks, Jefferson Lake Sulphur will take the wraps off its Rotosorber process (*CW Business Newsletter, Jan. 7*), which is gradually being put into operation at Bayou Sale field in St. Mary Parish, La. Jefferson Lake has so far said little on the subject. But it has been working on the process for several years, and successful trials are reportedly behind recent gyrations in the firm's stocks.

The commercial unit going onstream is at an Atlantic Refining well. It will process 40 million cu. ft. of gas daily, extract 5,000 gal. of butane and propane and an equal amount of natural gasoline. Essentially, the method is a dehydration of wet gas. *Petroleum Week* describes the unit as two columns approximately 8x12 ft., rotating in turntable fashion. Each column is alternately injected, then purged.

Reason for all the interest: reported economy of installation and operation.

The U.S. Patent Office will issue more than 10,000 chemical patents this year, an increase of 65% over 1955's total. That's the prediction of Lynn J. Bartlett, Jr., head of Information for Industry, Washington patent indexing firm.

Bartlett bases his predictions on an analysis of patents issued so far this year. His explanation for the increased number: chemical firms' stepped-up budgets have spawned more applications. Also, the Patent Office has expedited its service.

Eyebrow raiser: his survey indicates that nearly 20% of last year's patents to chemical companies are classified by the Patent Office as electrical or mechanical.

•

Last week, General Electric partly took the wraps off the $2-million Propellent Development Lab it has been operating for at least three months at Evendale, O. This was the firm's first formal admission that it has such an operation.

•

Work there for the most part involves top-secret work for the Air Force. And, of course, that's one area about which GE is still mum. All it says is that it's "exploring the burning of new fuels with heavier hydrocarbons than the present JP-4 jet fuel."

Technology
Newsletter

(Continued)

A completely crystalline polypropylene? That's what Germany's Karl Ziegler has been able to obtain by an extension of his now-famous catalytic polymerization technique. The method is described in Belgian patent 538,782. Significantly, it's issued to Ziegler and Montecatini; the latter has been sponsoring polymer work of Italy's J. Natta (*CW Technology Newsletter, Feb. 4*).

By using his special catalysts (e.g., aluminum triethyl with titanium tetrachloride) and then extracting with acetone, ether and n-heptane, Ziegler has obtained residues with melting points as high as 170 C. Structurally, the product is what Natta has dubbed isotactic—completely regular in the arrangement of asymmetric carbon atoms in the chain.

In the first published patent on such a product (Phillips' Belgian patent deals with an amorphous polypropylene, Ziegler lists over 30 examples, also goes into copolymerizations of propylene with ethylene and other alpha olefins. (Phillips has done a great deal of unpublished research on this phase.) Translations of the patent will sell for $45 each from Chemonomics.

•

Major developments in the treatment of Parkinson's disease (shaking palsy)—reported this month in the Journal of the American Medical Assn.—underscore the progress of pharmaceutical researchers in this field.

• A new drug, ethopropazine (Parsidol) hydrochloride, tested on 147 patients in New York's Presbyterian Hospital, proved more effective than any currently being employed. It helped control major tremor in 29 of 42 cases, minor tremor in 36 of 67 patients. It also proved effective against palsy sufferers' insomnia (11 out of 17), reduced muscular rigidity (11 out of 17) and improved gait, posture and speech (26 out of 41). No serious side effects were reported.

Effectiveness of the drug, made by Warner-Chilcott, is said to be limited in neurotic and emotionally unstable patients.

• Another article in the same issue reveals the existence of electronic instruments of measuring the amount of tremor and muscle rigidity. Thirteen patients undergoing ethopropazine treatment were tested with the instruments. Significance: by providing quantitative data, the electronic devices should speed development of new drugs for the disease.

•

Citrus wastes can be used to make a new type of wood stain, according to a recent patent (U.S. 2,723,899) granted to Chadeloid Corp. (Dayton, O.). It describes a method of combining hesperidin or naringenin from citrus pulp and aniline (or a related compound) to yield a flavanone azo dye.

The latter is dispersed in water to yield the stain, which may be applied hot or cold—preferably hot. The product's assets, according to Chadeloid, are its simplicity of manufacture and independence of organic solvents.

•

In cognizance of the private atomic energy program's increasing momentum, the Atomic Energy Commission last week:

• Established a policy permitting organizations or individuals to use (under certain conditions) AEC-owned facilities for their own purposes.

• Decided that the Yankee Atomic Electric Co. proposal, as modified, for an atomic power plant is acceptable. It calls for a pressurized water reactor with a net capacity of 134,000 kw.

• Granted permission for Babcock & Wilcox to build private industry's first critical experiment facility for nuclear reactor core tests.

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physical properties

Boiling point, °C @ 760 mm	190.5
Dilution ratio with Toluene	1.8
Evaporation rate (n-butyl acetate = 1.0)	0.02
Flash point, Cleveland Open Cup, °F	205
Pounds/gallon, 68°F	9.2
Refractive index, $\frac{20^\circ C}{D}$	1.4150
Solubility in water, % weight @ 20°C	16.4
Solubility water in, % weight @ 20°C	7.0
Specific gravity, 20°/20°C	1.1063
Vapor pressure @ 20°C mm Hg	0.25
Viscosity, centipoises @ 20 C	2.86
Viscosity, 10% 1/2 second nitrocellulose solution, centipoises @ 25°C	444

specifications

Specific gravity, 20°/20°C	1.103-1.109
Distillation range, °C	186-195
Ester content, % minimum	97
Acidity, as Acetic, % weight, maximum	0.15
Color, APHA	15

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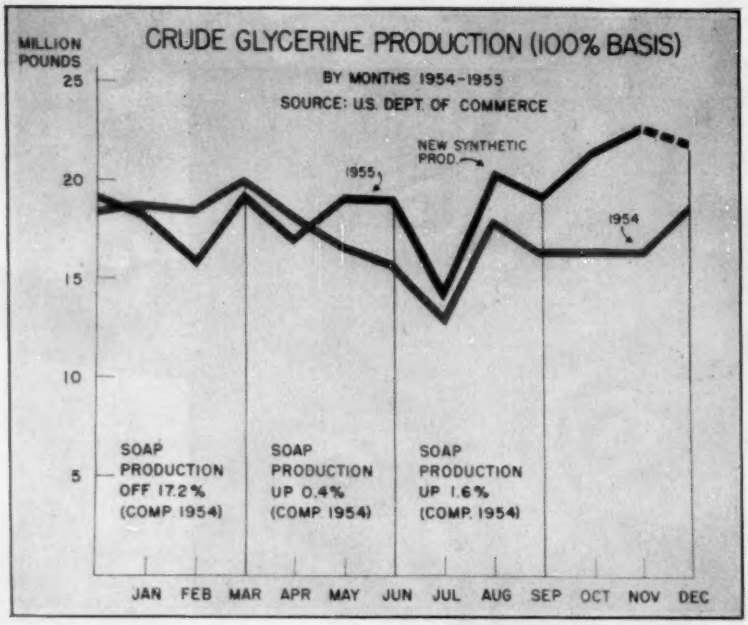

Storm Signals Come Down

Predicting the future of the glycerine market can be as tricky as charting the course of a September hurricane. Last year, for example, despite some dire predictions, competition, imports, and the impact of increased synthetic glycerine production failed to stir up much of a storm. Actually, the glycerine market experienced no major crisis, but logged a near-record U.S. consumption of 235 million lbs.

And at the 30th anniversary meeting of the Assn. of American Soap and Glycerine Producers at New York's Waldorf-Astoria hotel, attending glycerine marketers were asking plenty of questions about the unexpected calm that envelops the glycerine industry. Ready with some of the answers was Scott Pattison, manager of the association's Glycerine & Fatty Acid Division.

Plunging into a discussion of one pertinent market angle—that of glycerine's fast developing "dual origin" pattern—Pattison brought into focus the competitive relationship of synthetic and natural glycerine.

It's obvious that makers of synthetic glycerine are prospering; about a third of U.S. production is synthesized from propylene. And today, this output supplements rather than supplants markets held by natural glycerine. However, Pattison was quick to point out that in the future, following further increases of synthetic glycerine production, there may be argument as to which source is doing the supplementing.

Pattison indicates that developments in '55 seemed to prove that the dual-origin supply pattern does hold important advantages for glycerine buyers and all producers.

But the competitive pressure of synthetic glycerine is not the only factor shaping the future of natural glycerine. Important, of course, will be the continuing decline of soap production as synthetic detergents push for a still larger share of the detergent market.

Even here, though—where pessimism is apt to prevail—there's a ray of hope for glycerine producers. Soap production in the first quarter of '55 was down 17.2%, compared with the same period in '54. The second and third quarters, however, saw a reversal of the trend; soap production was up 0.4% and 1.6% for the respective quarters.

It would be too much to expect that this reversal presages a leveling off of the slipping soap production curve, but even a slowing of the decline would be a relief to glycerine makers.

An increase in fatty acid and alcohol production partly offset the first-quarter decrease in soapmaking, and the amount of glycerine derived from domestic fat in '55 probably was close to 146 million lbs. (on a 100% basis).

Compared with this, synthetic glycerine production totaled an estimated 82 million lbs. last year. Net imports were approximately 15 million lbs. It all adds up to about 243 million lbs. of available glycerine in '55, of which some 8 million have gone to increase stocks.

How Much More? One indication of what's ahead is contained in an Office of Defense Mobilization release issued last fall. ODM advanced the total glycerine capacity goal from 268 million lbs. to 325 million lbs.—indicating that considerably more than the currently "in sight" synthetic glycerine capacity (110 million lbs.) will eventually be required to fulfill upcoming demands.

(The goal-hike attracted much attention, coming as it did on the heels of Dow's active start in glycerine production, and in light of Shell Chemical's earlier announced additional capacity.)

Pattison, however, is unable to reconcile what he calls "a rational economic standpoint" with the near-term expansion of synthetic capacity envisioned by ODM. He considers 250-260 million lbs./year of domestic glycerine (one-third to one-half synthetic) a fully adequate and stable source of supply for at least the next three to five years.

An estimate of the nation's glycerine needs must, of course, take into account the possibility that other polyols may replace glycerine in the manufacture of alkyd resins and that alkyds themselves may be displaced by non-glycerine paint vehicles.

Whether or not alternate polyols will cut heavily into this glycerine outlet is a debatable point, but right now glycerine remains the big-volume alkyd polyol, with 18-20% of the nearly 400 million lbs. total alkyd production.

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Alternate competing materials for all such specific glycerine uses are trying to make capital of glycerine's historically erratic supply and demand trends, as well as cost patterns.

Two factors seem to have averted a swing to substitute materials: for one, the anticipated increase of synthetic glycerine in the second half of 1955 was expected to contribute to supply and demand stabilization; two, the tempering effect of such added domestic capacity on the holders of foreign crude may serve to moderate the characteristic wild fluctuations of imported glycerine supplies.

Imports Up Again: Imports of crude glycerine in '55 amounted to some 25 million lbs., but because of substantial exports of refined glycerine, the net import supply was about 15 million lbs.

This import/export balance was in marked contrast with the extremes witnessed in the two preceding years. In '53, net imports soared to a staggering high of 31 million lbs. But in '54, exports topped imports by 2-3 million lbs.

Last year saw a return to a more normal relationship—if indeed there is such a thing as normal balance in the glycerine import/export picture.

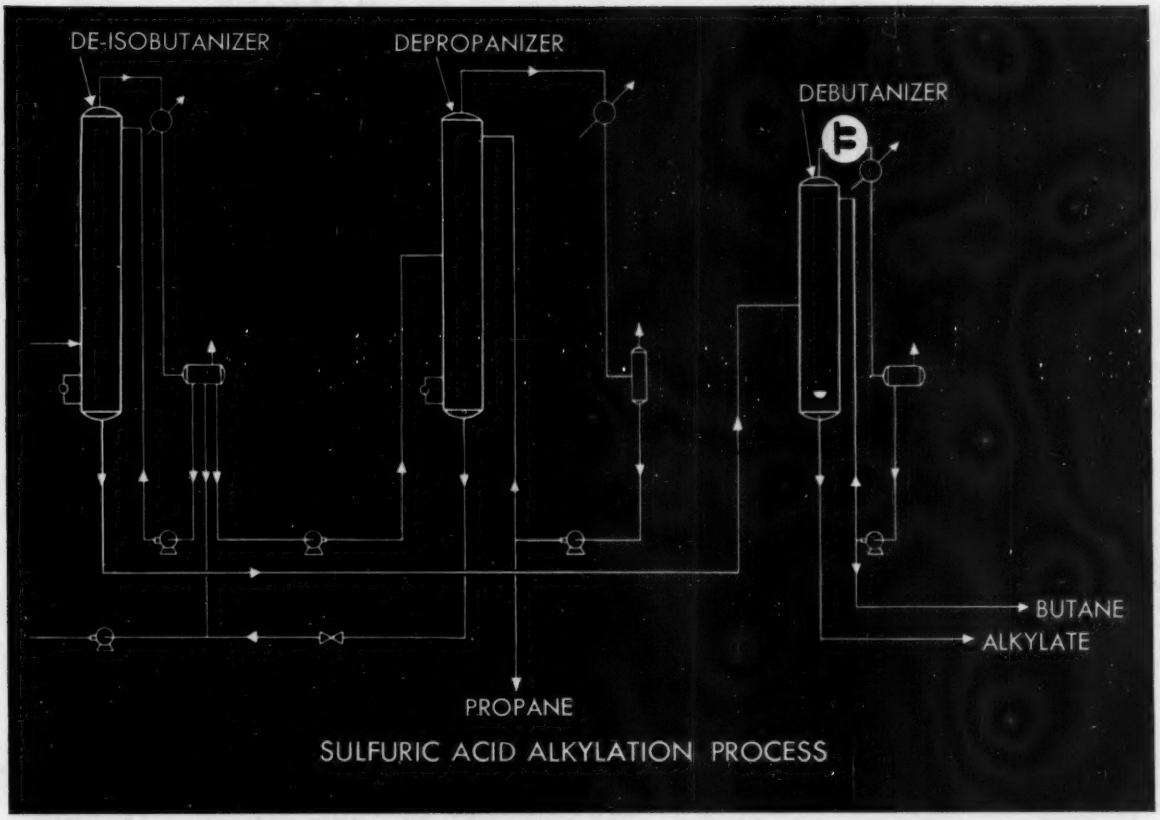
At any rate, continued moderation of import fluctuations would work for the benefit of all domestic glycerine producers, Pattison believes. And, he adds, the development of a substantial U.S. synthetic glycerine capacity "will help assure customers that panicky buying sprees may well become events of the past. The resulting calmer atmosphere in the marketplace should encourage expansion of glycerine outlets, benefit everyone right down the line—from producer to buyer."

Titanium Turnout

PHENOMENAL is the word best describing the technical advances made in titanium processing; within a brief five years, rolled ingots—spurred by aircraft needs—have grown in size from a few pounds to as much as 6,000 lbs. each.

Early versions of the DC-7 and the new long-range DC-7C contain, respectively, about 350 and 850 lbs. of titanium in their airframes. Much larger quantities will be needed for the DC-8 commercial jet airliners.

Highlighting the industry's rapid progress was the shipment this month of the first two carloads of titanium sheet to Douglas Aircraft from the Leechburg, Pa., plant of Titanium Metals Corp. of America (*see cut*).



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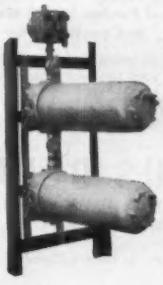

P-E TRI-NON Analyzers are available in a wide range of models and prices to meet all types of continuous analytical problems. They are rugged and dependable, expressly designed for use in the varied environments of a processing plant or refinery. For quick and easy maintenance, instrument components can be tested right on stream — without disconnecting.

Safe to Eat?

A rehash of the long-standing issue of diethylstilbestrol's possible carcinogenic effect is again focusing attention on the use of drugs in animal feed supplements.

Latest attack on stilbestrol (a hormone-like synthetic used in cattle feeds) was made by William E. Smith, of the American Academy of Nutrition, during a recent Food & Drug Administration symposium in Washington.

But despite Smith's vehement arguments, the consensus of government and industry technicians is that the nation's meat-eaters have little to fear if feed processors use the chemical according to FDA regulations.

At stake is the fast-growing market for stilbestrol—still relatively small in poundage, as chemicals go, but substantial in dollar value. For example, in 1953 (the last year for which stilbestrol sales figures were reported by the Tariff Commission), about 4,000 lbs. were sold. The unit value was $51.22/lb.

Since '53, the number of producers has dropped to two—Eli Lilly (Indianapolis) and Specific Pharmaceuticals (Bayonne, N.J.); hence, sales and production figures are no longer available.

But some idea of the size of this growing market can be gleaned from the fact that the current production of supplemented feed amounts to 7-9 million tons/year (20-25% of the total feed market), and that over 20 different drugs are mixed in the various supplements. Furthermore, within the next few years this percentage is likely to increase sharply, perhaps double.

How much stilbestrol gets into feed is a well-guarded trade secret, but it's probable that half the beef cattle in the country are now fed some amount. The usual dose is 10-11 milligrams/day.

Use of the chemical in poultry growing was previously questioned, and was settled in stilbestrol's favor. But because the drug is not mixed into poultry feed, but is applied by other means, these earlier investigations have not set a precedent that's strictly applicable to the current fracas. Nonetheless, stilbestrol marketers are stacking up a pretty sound case for continued use of the drug in cattle feed.

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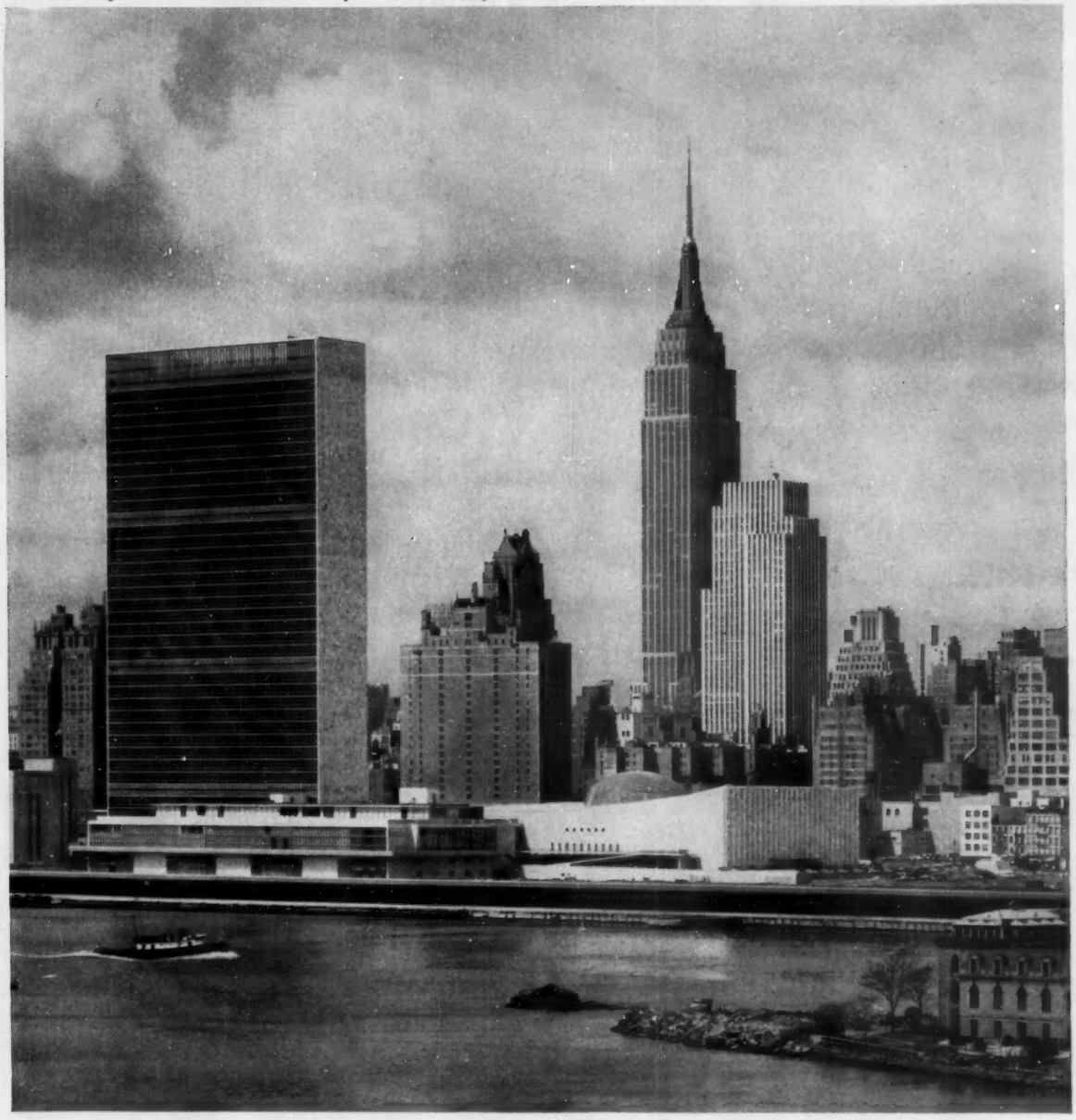

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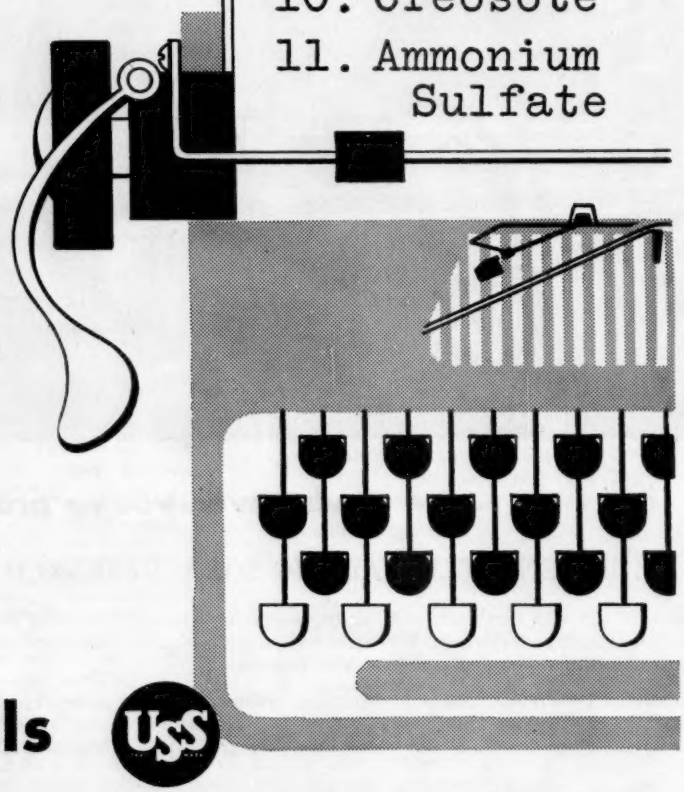

See "THE UNITED STATES STEEL HOUR" — Televised alternate weeks — Consult your newspaper for time and station.

USS Chemicals

6-04

UNITED STATES STEEL

Market

Newsletter

CHEMICAL WEEK
February 18, 1956

Quick confirmation of last week's prediction (*CW Market Newsletter, Feb. 11*) are this week's higher prices on cadmium lithopone red colors. The increases (ranging from 22¢ to 72¢/lb., depending on shade) are being posted by at least two major producers, Glidden and American Cyanamid.

The new prices set the extra light shade (in barrels) at $2.24/lb.; light and medium shades up to $2.49 and $2.99, respectively; medium maroon at $3.77/lb.

Reasons for the advance, of course, are the continuing critical shortages plus the recent sharp boost ($5/lb.) in cost of the basic material, selenium.

But at least one pigment maker is skirting the scarce selenium problem in manufacturing red colors. Imperial Paper & Color (Glens Falls, N. Y.) is currently making a strong bid for part of the lush (estimated $5-million) cadmium reds market with a new group of colors labeled Mercadmium Reds, priced at a range of $1.78 to $2.40/lb., much lower than the sulfoselenides.

Imperial's reds are reportedly made from mercury sulfide and cadmium, contain no selenium.

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Priced lower this week, too, are some organic isocyanates. Du Pont is knocking off 15¢/lb. on its Hylene line. Reason for the reduction, says the company: increased volume of sales due to an expanding market. The isocyanates, combined with other compounds that form rubberlike or plasticlike materials, are pushing into a number of fields including building, transportation, upholstery and insulation.

Lower Du Pont tags: Hylene T, $1.15/lb.; TM, $1.05/lb.; TM-65, $1.05. Prices apply to standard (500 lb. net) drums.

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Looking for commercial quantities of propylene? Allied Chemical's Semet-Solvay Petrochemical Division is now ready to sell, for the first time, tank-car and tank-truck amounts. The company, turning out more propylene at its Tonawanda, N. Y., plant than it can consume, will initially make available to the open market some 2.5 million lbs./year.

Typical analysis in mol percentages: C_2's, 1.5; propane 3.0; propylene, 94.0; C_4's, 1.5.

The feed industry can buy more "nondry" phosphate supplements. Shea Chemical is bucking the "dry phosphates" market with the relatively new "liquid" material. "Immediate availability" of the latter is promised from Shea plants at Adams, Mass., Columbia, Tenn., and Jeffersonville, Ind., and from Dallas, Tex., when the firm's new plant is completed there this fall.

Says Shea: the liquid material will cut phosphate costs to feed producers from $4 unit of phosphorus down to about $3.59, freight exempted. The liquid contains approximately 23.7% phosphorus, will sell for $85/ton (tanks).

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Speaking of farm-used chemicals, the probability of a future ammonia surfeit was emphasized again last week. This time Kenneth Spencer, president of the Spencer Chemical Co., told the New York Society of Security Analysts that "there's likely to be a 15-20% surplus plant capacity in ammonia" within the next several years.

Spencer noted that current operating capacity of the industry's 43

plants amounts to 4.14 million tons, and—when 11 additional plants come in by next year—U.S. total capacity will jump to a near-4.9 million.

•

Out of Washington comes word of interest to the naval stores industry. The federal loan program for 1956 will be substantially the same as that in effect last year.

The new support level of $27.66/standard bbl. of pine gum (processed basis) reflects 90% of the parity price of crude pine gum (unprocessed basis).

Bulk turpentine initial loan rates will be 50¢/gal., and $7.49/cwt. on average WG-grade gum rosin. Rates for grades X and WW will be 10¢ higher; N, M, K and I, 10¢ lower.

•

And out of the nation's capital, too, comes advice anent selenium. If you have any of the scarce metal or its chemical derivatives to ship out of the country against the second-quarter quota, you should file your requests for licenses during the first 15 days of next month. That's the period for filing just set by the Bureau of Foreign Commerce.

Covered in the government agency's notice are these selenium items: powder; metal (except selenium-bearing scrap materials); salts and compounds including selenium dioxide; salts of organic compounds; selenium-containing pigments; selenium-containing rubber compounding agents not of coal-tar origin; and ferroselenium.

•

Tetraethyl lead antiknock compounds are going to cost more beginning next month. Ethyl Corp. jumped the field early this week with announcement that prices of its antiknock agents would go up by about 2½% on March 12.

Within hours, Du Pont, the only other producer, was ready to notify customers of its comparable increases to become effective March 14 on domestic schedules.

New prices posted by the two firms appear widely divergent, but explanation is that each uses a different basis—TEL content by Ethyl, antiknock compound by Du Pont. Typical: Ethyl's TEL for regular gasoline will cost 60.18¢/lb.; for aviation gas, 66.08¢. Du Pont's compounds: motor mix to 37¢/lb.; aviation mix upped to 40.58¢/lb.

SELECTED CHEMICAL MARKET PRICE CHANGES
Week Ending February 13, 1956

	Change	New Price
UP		
Dried blood, high-grade, ungrd., 16-17% ammonia, bgs., Chic., unit-ton	$ 0.25	$ 4.75
Red cadmium lithopones, bbls., frt. alld., E. of Rockies:		
Extra light	0.22	2.24
Medium light	0.30	2.49
Dark	0.62	3.44
Maroon	0.72	3.77
Tankage, animal, feeding, 9-11% ammonia, Chic., bulk, unit-ton	0.25	4.75
DOWN		
Elemental boron, 90-92%, 100 lbs. or over, f.o.b. Vernon or Trona, Calif.	7.00	13.00

All prices per pound unless quantity is stated.

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CONSULTANT McNEILL: 'Budgeting isn't supposed to make clerks out of research men. It's intended to help management spend research money profitably.'

'Everyone Needs a Budget'

Up this year and climbing fast, the nation's industrial research outlay pinpoints a paradox. Expected to set a $5-billion high and increase at least 50% in the next decade, it's more stringently budgeted than ever before. Why? Because stiffening research competition demands top return on each dollar spent. But to a broad cut of small or moderate-size companies, whose budgeting know-how hasn't kept pace with stepped-up spending, the trend poses real problems. Lacking precise knowledge of project costs, they cannot take full advantage of increasingly important economic factors in picking new projects.

Consultant Winfield McNeill, retired vice-president and controller of General Aniline & Film Corp., continually comes up against the plight of the small firm operating in an era of big research.

To such seemingly overmatched competition, he says: "Look closely at how large companies organize their cost control and budgeting functions for research and development, then adapt these to suit your needs."

This calls for:

(1) the establishment of research projects as "cost centers" around which expenses are collected and analyzed;

(2) a reliable system of reporting expenses—the paper and clerical work;

(3) collection of cost data—to help fix expenses of each project, ascertain profit potential;

(4) preparation of an annual budget for executive review.

These major budgeting steps apply to any organization, in varying degree. The research endeavor of a big company may have a great many projects calling for appreciable paper work and elaborate accounting codes; while smaller firms may get by with a much simpler scheme to account for such items as equipment purchases and staffers' time.

But in any event, stresses McNeill, the procedure isn't supposed to make clerks out of research men; it's intended to help management decide where to spend research money most profitably, to supply facts to back up such decisions.

"It's important to realize," he avers, "that the only reason for spending money for industrial research and development is to improve the company's profits over a period of time. So research should be subject to evaluation on the same terms as any other phase of the business."

McNeill emphasizes that the foregoing applies only to applied research, since—he points out—even in large companies, "the money appropriated for basic research is largely a matter of judgment, can be appraised as an investment only over a relatively long period of years." And for small firms, he feels that basic studies are best done by outside laboratories, research institutes or academic grants.

The Hard Way: "Large or small, a company will better safeguard its interests if it conducts a formal evaluation prior to starting a project and sets up routines for periodic reappraisals. If it is accustomed to launching projects without a good idea of what they will cost, or without a market survey, or without getting firm commitments for proposed products,

Story begins on p. 102

'Don't be afraid of turning up economic duds. Every creative research organization has its share of projects that don't pay off.'

it may soon learn the importance of strict budgeting—the hard way."

Projects should be evaluated each year when the budget is prepared, when new projects are introduced during the year, and after each principal research step (e.g., transfer from the laboratory stage to the pilot plant or job shop).

And it's important to be aware of the principal factors that can influence continuation of a project: issuance of pertinent patents to competing firms; changes in market conditions; results obtained between reviews; and, of course, a change in the amount of company funds immediately available for the work.

Another place where a good grasp of research costs will help is in making judgments concerning products. For instance, if a particular product has been losing money, research costs may be the decisive factor in determining whether to embark on further product development or to discontinue the product itself.

"Don't be afraid," advises McNeill, "that putting projects under close scrutiny will turn up economic duds. Every creative research organization has its share of projects that don't pay off—or it's not being as creative or as confident as it should be."

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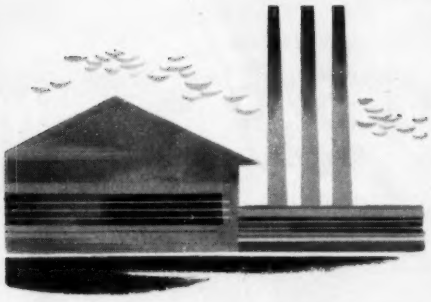

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ZEREMSKY (left) and HANSEN: There is no harm in trying.

Food Film Fortifiers

Two new vinyl stabilizers are giving polyvinyl chloride film makers a fighting chance to snare an estimated $10-20-million share of the $200-million—and growing — food-packaging-film market.

Developed by the Ferro Chemical Corp. (Bedford, O.), the stabilizers are reported to be nontoxic. They are the first high-temperature-resistant stabilizers to be cleared by the U. S. Food & Drug Administration for use in vinyl food-wrapping.

The products*, called Nontoxic 707 X and Nontoxic 760 X, are said to help prevent discoloration of vinyl films by hydrochloric acid released during processing of the resin into film (at 350 F).

Darkening during processing has been the big hurdle to vinyl film's acceptance by food packagers, an obstacle that film makers hope will be removed by the new stabilizers. Hitherto, the only vinyl chloride to find application for this purpose has been a relatively small 2-3 million lbs./year of cast film (made by Visking and Bakelite) that leaves something to be desired in transparency and water permeability.

Polyvinylidene chloride (Dow's saran), a close relative of polyvinyl chloride, is a well established food wrapping material.

Dow reports it uses FDA-approved stabilizers in its saran food packaging, won't disclose what they are, chemically. Presumably, saran requires milder processing conditions than does polyvinyl chloride film; hence doesn't call for high-temperature stabilizers.

Nontoxic stabilizers (e.g., potassium and sodium citrate) are no novelty, but the familiar specimens don't withstand the heat of film making. High-temperature stabilizers, such as lead and cadmium-barium compounds, on the other hand, are too toxic for food-packaging use.

Ferro isn't revealing the chemical nature of its tyro pair. But they are known to be mixtures of organometallic salts; Ferro says they contain no tin or strontium. A further clue to their composition is contained in U. S. Pat. 2,711,401, granted last June to Ferro's Robert Lally. Filed on a stabilizer for rigid vinyls, the patent suggests that the newcomers are mixtures of calcium and zinc salts (e.g., calcium

*Priced at 95¢/lb., 1 lb. of stabilizer is required for 100 lbs. of resin. Other stabilizer systems cost $1.50-5.00/100 lbs. of resin.

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APPLICATION	PRIMARY FUNCTION OF PETRONATE	SECONDARY FUNCTION
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1. Insecticide Emulsions	Emulsifying Agent for Toxicant	Spreading Agent
2. Textile Oils	Emulsifying Agent for Textile Processing Oils	Wetting and Dispersing Agent for Textile Fibers
3. Leather Oils	Emulsifying Agent for Leather Processing Oils	Wetting and Dispersing Agent for Leathers
DISPERSION AND WETTING OF SOLIDS		
4. Rubber Manufacture	Thermo Plasticizing Agent	Increases Dispersibility of Filler
5. Fuel Oil	Keeps Sludge in Suspension	Prevents Segregation of Moisture
6. Printing Ink Manufacture	Aids dispersion of pigment	Reduces Viscosity of Ink
7. Ore Flotation	Flotation Reagent	Selective Wetting Agent
8. Additives for Lube Oil	Acts as Detergent	Inhibits Bearing Corrosion
WETTING AND DISPERSION OF LIQUID-SOLID SYSTEMS		
9. Crude Oil Emulsion Splitting	Reverting Agent for Water-in-Oil Emulsions	Aids in Wetting out Salts and Solids
10. Emulsifiable Solvent Cleaners	Dispersing Agent for Oil and Grease Deposits	Acts as Emulsifying Agent
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ethyl acetoacetate and zinc 2-ethylhexoate).

Ferro researchers Baruch Zaremsky and F. Robert Hansen, who pioneered the stabilizers (on which patents have been filed), early recognized the need for a stable plasticizer that is compatible with their compounds. The cooperation of Rohm & Haas in appraising the latter's FDA-appraised Paraplex G 60 (an epoxidized soybean oil) yielded formulations that meet film processing conditions.

A bevy of other companies are eyeing the potentially lucrative opportunity in stabilizers for vinyl food films. Witco Chemical (New York)

Safety Overseer

FERRO'S new stabilizers, like all materials aspiring to use in food packaging, had to gain the approval of FDA pharmacology division chief Arnold Lehman (*above*), by passing strict toxicity and allergy tests. Actual testing of food-film ingredients is done by companies submitting materials for inspection. FDA gauges food-film acceptability by film composition, composition constancy, extractability by each type of food for which it will be used, etc. Lehman's group evaluates test data, reviews proposed testing, makes suggestions for modifying in-progress investigations.

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Insoluble Matter	0.010%
pH of 20% Solution at 25°C.	3.0-4.0
Substances not precipitated by H_2S (as SO_4)	0.30 %

Color—White

LEAD ACETATE, Technical Crystal Small Crystal Granular 4-20 Mesh Powder

$Pb(C_2H_3O_2)_2.3H_2O$ — F. W. 379.35

Assay ($Pb(C_2H_3O_2)_2.3H_2O$)	99.0-105.0%
Insoluble Matter	0.020 %
pH of 5% Solution at 25°C.	5.5-6-5
Substances not precipitated by H_2S (as SO_4)	0.20 %

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PbO_2 — F. W. 239.21

Assay (PbO_2)	90.0 %
Insoluble in HNO_3	0.20%
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Color—Light Chocolate Shade

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reports that its nontoxic stabilizer, Stayrite 90, is effective up to 325 F. Metal and Thermit (New York) and Advance Solvents (New York) are studying tin compounds for the purpose, have not come up with satisfactory candidates.

Others, including Harshaw Chemical (Cleveland) and Nuodex (Elizabeth, N. J.), are also still researching.

Among firms evaluating nontoxic epoxy plasticizers are Archer-Daniels-Midland (Minneapolis) and Baker Castor Oil (New York). However, Paraplex G 60 is the only FDA-cleared epoxy, to date.

Now that their stabilizer problems have been reduced, vinyl film makers, looking at both quality and cost considerations, expect their products to provide stiff competition for both polyethylene and cellophane (56-59¢/lb. on a 1½ mil basis). Vinyl's other features—odor and grease resistance, good vapor and oxygen transmission properties—are also expected to be assets.

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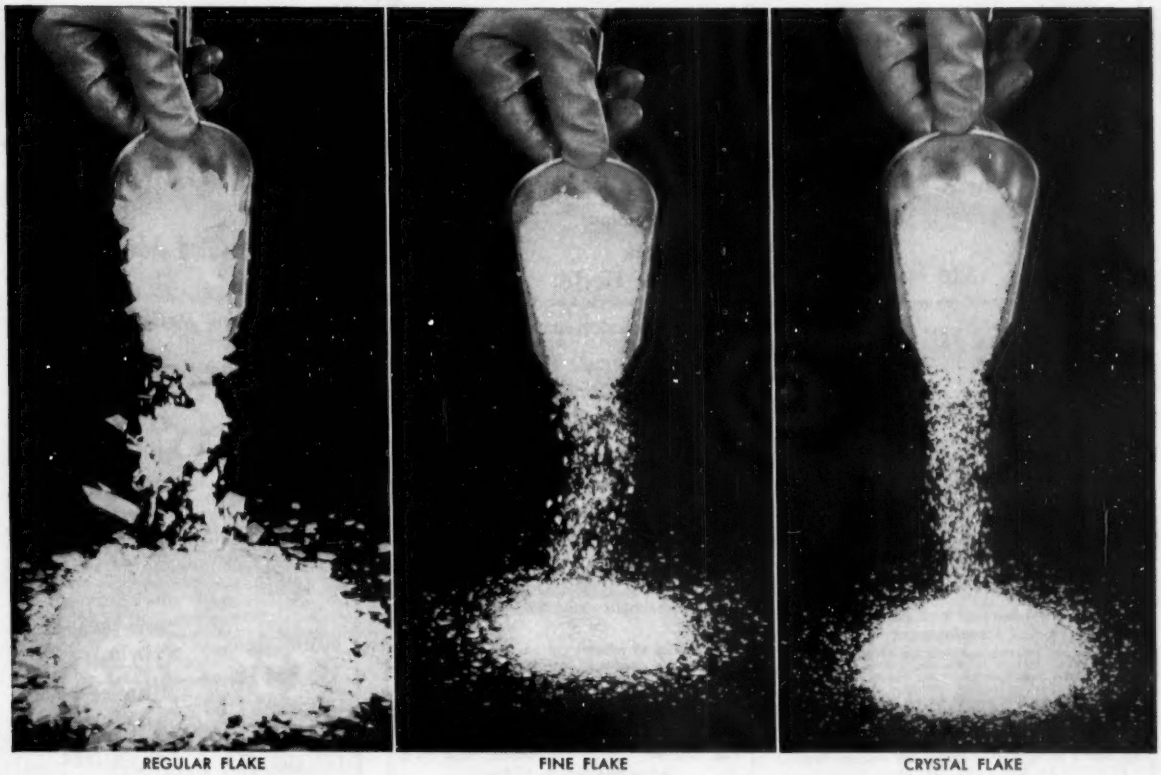
Dr. Elmer Berry of the National Health Institute's Tropical Disease Laboratory (Bethesda, Md.) told *CW* last week that sodium penta-

*Malaria and tuberculosis are first and second, respectively.



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chlorophenate is the probable key to an international public health problem afflicting some 200 million people.

The chemical is sprayed on tropical streams and marshes to kill off snails, which carry the disease. But the simplicity of this countermeasure is misleading. For the National Health Institute screened over 3,000 chemicals before it uncovered the right one. Then Berry spent six years conducting global field tests to prove its efficacy.

Now he'll return to Egypt, one of the test countries, to attempt full-scale control. He's convinced that with the proper approach bilharzia can be brought under control within five years at a cost of less than $2 million.

Sodium pentachlorophenate is made by Dow (Dowcide G) and Monsanto (Santobrite), used as a wood preservative. Berry thinks highly of it because of its low cost (27¢/lb.), toxicity to snails in low concentrations (5 ppm.). In addition, it's water-soluble, kills both the snails and their eggs, retains its toxicity in heavy vegetation, and is relatively harmless to humans in the concentrations employed.

Boring from Without: The disease is caused by a small worm that feeds on snails in countries such as Puerto Rico, Philippines, India. The worm bores through the skin of wading natives, enters the bloodstream, causes internal hemorrhaging, and leaves the intestines brittle. Although normally not fatal, it saps its victims' strength, weakens their resistance to other diseases. The disease attracted attention in this country during World War II when some 1,700 servicemen came down with it. There's no positive cure. And because of its extensiveness and the generally low economic status of the people afflicted with it, efforts have concentrated on prevention rather than cures.

Bilharzia control measures probably can be applied to liver fluke and similar flatworm diseases that attack cattle in the South and in California.

•

Southern Switch: Florida's first atomic reactor will probably be at University of Miami, rather than at University of Florida (Gainesville), despite the latter's head start via a $500,000 reactor appropriation by the 1955 state legislature. Miami U. faculty dean Charles Doren Sharp says that work on the reactor will begin as soon as AEC issues a license.

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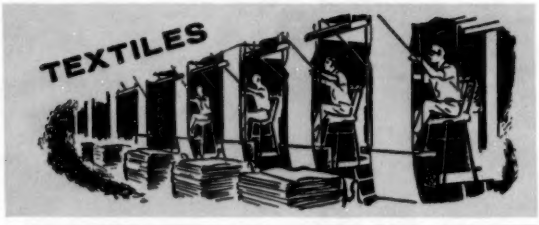

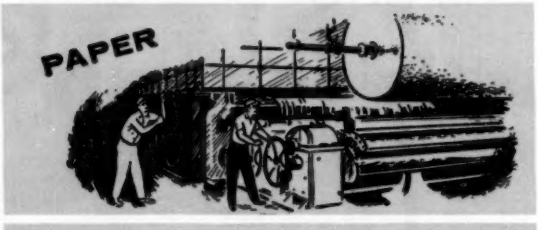

It is interesting to note that further growth is predicted for the major products made from Formaldehyde. This applies, for instance, to phenolic molding and laminating resins—urea and melamine resins for textiles, paper and plywood—and various organic chemicals.

Heyden Formaldehyde is helping in this growth, as it has right from the original development of these products. Experience, gained through this long association with customer problems, has enabled Heyden to meet the most exacting needs of each use. As new applications arise, Formaldehyde with the proper specifications will be available from Heyden.

Both methanol-inhibited (N.F.) and methanol-free forms of Formaldehyde are supplied by Heyden. If this chemical is one of your raw materials, why not discuss your requirements with the Heyden sales office nearest you.

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